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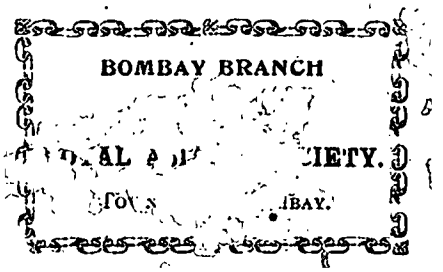

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Groupes of different Coralline growing on Shells, supposed to make this Appearance on the
of the Sea at a very Low Ebb Tide.

AN ESSAY TOWARDS A NATURAL HISTORY OF THE CORALLINES,

87985

AND OTHER

MARINE PRODUCTIONS of the like Kind,

Commonly found

On the Coasts of GREAT BRITAIN and IRELAND.

To which is added

The DESCRIPTION of a large MARINE POLYPE taken near the *North Pole*, by the Whale-fishers, in the Summer 1753.

By *JOHN ELLIS*, F. R. S.

LONDON:

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M.DCC.LV.

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TO

HER ROYAL HIGHNESS

THE

Princeſs Dowager of *WALES.*

MADAM,

ANIMATED by the Attention Your Royal Highneſs condeſcended to beſtow, on many of the Subſtances deſcribed in the enſuing Pages, I have purſued my Enquiries concerning them, with an Ardour that only ſuch an Influence could inſpire.

The minuteſt Works of Creation are not always the leaſt wonderful: And though the Element, of which theſe are Natives,

 prohibits

prohibits an exact Enquiry, yet enough of Order, Contrivance, and Regularity, appear in their Structure, to convince us, they are the Workmanſhip of that Almighty Power, whom, exalted as you are in Dignity of Sentiment, as well as Station, you think it your higheſt Honour to reverence and obey.

As every Attempt, however humble, to explore the Works of the Moſt High, and to manifeſt his Care and Kindneſs to the whole Creation, meets with your Approbation, accept, Moſt Illuſtrious PRINCESS, with a favourable Aſpect, theſe Endeavours; and, at the ſame time, my fervent Prayers, That you may long continue a Bleſſing to theſe Kingdoms, and your Royal Offſpring to late Poſterity. I am, with the utmoſt Reſpect,

Your Royal Highneſs's

Moſt obedient and

Moſt humble Servant,

London, Dec. 15, 1754.

JOHN ELLIS.

INTRODUCTION.

WHAT the Reader is to expect in this Eſſay, will perhaps be learned, with moſt Satisfaction, from the following Account, of the Author's Inducements to engage in ſuch Diſquiſitions, the Difficulties that attended them, and the various Succeſs.

In the Autumn of the Year 1751, I received a curious Collection of Sea-plants and Corallines from the Iſland of *Angleſey*, in *North Wales*, and another from *Dublin*. In order to preſerve ſome Specimens of the moſt rare Kinds, particularly thoſe that were remarkable for their Colours, I expanded them on Paper in freſh Water, laying out their fine Ramifications with ſome Exactneſs; for which Method, with many uſeful Hints in Botany, I am indebted to that excellent Botaniſt Mr. *Buttner*, of *Berlin*.

Theſe, when properly dried, I diſpoſed on thin Boards covered with clean white Paper, in ſuch a manner as to form

form a kind of Landſcape, making uſe of two or three Sorts of the *Ulva marina*, or Sea-Liverwort of different Colours, in deſigning a Variety of Hills, Dales, and Rocks, which made a proper Ground-work and Keeping for the little Trees, which the expanded Sea-plants and Corallines not unaptly repreſented.

My ingenious and Reverend Friend Doctor *Stephen Hales*, paying me a Viſit, was pleaſed to expreſs great Pleaſure in viewing theſe natural lively Landſcapes; and deſired me to make ſome of the ſame Kind for her Royal Highneſs the Princeſs Dowager of *Wales*, that the young Princeſſes might amuſe themſelves, in diſpoſing theſe beautiful Productions in the like pictureſque Manner. And for that Purpoſe, further requeſted me, to collect all the Varieties our Sea-coaſts afforded; which I did, by the Help of my worthy Friend *George Shelvocke* Eſquire, Secretary to the Poſtmaſter-general, and ſome of my Acquaintance in *Ireland*.

I had the Honour, through my Reverend Friend, to preſent ſome Pieces of this Kind to her Royal Highneſs, who was pleaſed to accept them with her uſual Condeſcenſion.

The great Variety, that came through my Hands, determined me to ſeparate all the different Species, and to diſpoſe them in proper Claſſes. To aſſiſt me in this Part of my Labour, I had Recourſe to the learned *Ray*, who, in his *Synopſis Stirpium Britannicarum*, has given the beſt Account we have yet had of theſe Productions, as well as of the indigenous Plants of *Great Britain* and *Ireland*.

In order to diſtinguiſh their proper Characters with the greater Accuracy, I found it neceſſary to examine them in the Microſcope; by which I ſoon diſcovered, that they differed not leſs from each other, in reſpect to their Form, than they

they did in regard to their Texture; and that, in many of them, this Texture was ſuch, as ſeemed to indicate their being more of an animal, than vegetable Nature.

This put me on ſeparating ſuch as had theſe apparent Indications, from thoſe, which, from their Form of growing, I ſtill took to be Sea-plants; placing thoſe in a third Claſs, which ſeemed to partake of the Nature of both.

The firſt Diviſion comprehended all thoſe, that were evidently the *Nidus's*, or Cells of Animals.

The ſecond took in the curiouſly branched Corallines.

The laſt conſiſted of the ſtony articulated Corallines and *Keratophyta*.

Theſe were regularly diſpoſed in four Pictures, which I had the Honour to produce before the Royal Society, about *June* 1752, with a Deſcription of their Contents, as they then appeared to me.

As I was convinced, from my own Obſervations of the Subjects themſelves, that ſeveral, which had hitherto been conſidered by Naturaliſts, as Marine Vegetables, were in Reality of animal Production: So from the Opinions of ſeveral Gentlemen then preſent, my Suſpicions were increaſed, that others likewiſe, which I had taken for Vegetables, might in Reality be of an animal Nature.

To determine how far theſe Suſpicions were juſt, it ſeemed the moſt expedient to examine the Subjects, when recent, with Attention. And accordingly, in *Auguſt* 1752, I went to the Iſland of *Sheppey*, on the Coaſt of *Kent*; and took with me Mr. *Brooking*, a celebrated Painter of Sea-pieces, to make the proper Drawings for me. Here we had

an

an Opportunity of ſeeing theſe diſputed Beings called branched Corallines, alive in Sea-water, by the Help of a very commodious Microſcope, of Mr. *Cuff*'s the Optician in *Fleetſtreet*, which I had altered for that Purpoſe; and was fully convinced, that theſe apparent Plants were ramified Animals, in their proper Skins or Caſes, not loco-motive, but fixed to Shells of Oyſters, Muſſels, *&c.* and to *Fucus's*.

The firſt Coralline that occurred to me, was that which is expreſſed in Plate II. at N°. 3. A Part of it, as it appeared alive, is deſcribed magnified at Letter *A:* This, together with other Proofs, that then occurred, induced me to withdraw the Paper I had laid before the Royal Society; and to purſue with Attention my Enquiries concerning this Subject; both with a View to my own Satisfaction, as well as to afford thoſe, who yet doubted, the Means of ample Conviction.

In the Beginning of *June* laſt, 1754, I prevailed on Mr. *Ehret*, a Gentleman univerſally known to the learned Botaniſts of *Europe*, for his exquiſite Manner of deſigning and painting Plants and Flowers, to accompany me to the Seaſide at *Brighthelmſtone*, in *Suſſex*; there to draw from Nature, whatever the Microſcope preſented him of theſe extraordinary Beings. An Account of this Journey, with his curious Drawings, the Royal Society have honoured with their Acceptance. Here we ſaw, amongſt others, the Coralline, N°. 14. Plate IX. Letter *b*, with all its minute capillary Branches expanded.

Letter *C*, ſhews one of theſe Branches magnified, as it appeared in the Sea-water through the Microſcope, with its Polypes united together, repoſing in their Sockets, and with their Arms extended.

We

We had alſo an Opportunity of ſeeing thoſe Corallines in Motion, whoſe Polypes are contained in Cups, ſupported by a long Stem that appears full of Rings, or as if they were twiſted in Form of a Screw (See Fig. *C*, Plate XII). In the Middle of the tranſparent Stems or Caſes, we could eaſily diſtinguiſh the Thread-like tender Part of the Animal, united to the Bottom of each Polype.

As we were obſerving this, we accidentally diſcovered the Figure of the Polype, that ſpreads its Cells over *Fucus's*, and other Marine Subſtances. The Figures of the Cells are expreſſed in Plate XXIX, at Letter *D*. And the Animal in its Cell at *D* 1.

On ſeveral Parts of theſe Corallines there are little Bodies, which, through the Microſcope, appear to be ſo many Veſicles or Bladders: To the Uſe of theſe I was altogether a Stranger till this Journey: But now I diſcovered that they were *Matrices*, or Habitations of young Polypes, which are produced here and there, on the Sides of the Parent, as in the Freſh-water Polype, only in the marine ones they are protected with this veſicular Covering. Theſe Veſicles appearing at a certain Seaſon of the Year, according to the different Species of Corallines, and then falling off, like the Bloſſoms or Seeds of Plants, has made ſome curious Perſons, who have not had an Opportunity of ſeeing the Animals alive in the Veſicles, conclude them to be the Seed-veſſels of Plants; and into this Miſtake I was led myſelf, in the Account laid before the Royal Society in 1752. In which Account I had taken ſome Pains to point out the great Similitude between the Veſicles, and denticulated Appearance of ſome of theſe Corallines; and the Tooth-ſhaped Leaves and Seed-veſſels of ſome Species of Land-moſſes, particularly of the *Hypnum*

and *Bryum*. One of which Corallines is exhibited at *B*, Plate III. and another at *B*, Plate V.

And for want of examining theſe Corallines, as I may ſay, alive in their proper Element the Sea-water, others likewiſe had formed erroneous Opinions concerning them, as well as myſelf: Some imagining theſe little Veſicles only to ſerve as ſwimming Bladders, like thoſe in the *Acinaria* or Gulph-weed, and the *Quercus Marina* or Sea-Oak.

There are two of theſe Veſicles, with the larger Polypes in them expreſſed, magnified near the Middle of the Fig. *A*, in Plate V.

Thoſe are called Denticles, that look like Teeth, and are placed oppoſite to each other on the Sides of the Stem and Branch of the ſame Figure.

Theſe larger Polypes are united below by a tender thready Line, to the fleſhy Part that occupies the Middle of the whole Coralline.

In ſome Inſtances, we may obſerve, that theſe Animals are wrapt quite round in their Veſicles, during their Embryo State, like thoſe in Plate XI. Fig. *C*. As theſe advance in Size, and grow towards Maturity, the Top of the Veſicle begins to open, the Animal ſtretches itſelf out, and diſplays its Arms about in Search of Food; and when it is in the leaſt diſturbed, it ſuddenly contracts itſelf to the Bottom of the Veſicle, which cloſes after it at the Top.

Some Species of Corallines have little elaſtic *Opercula* or Covers to their Veſicles, to ſecure the Mouth or Entrance of the Veſicle upon the Animal's Retreat to the Bottom of it, as in Plate III. Fig. *B*.

Theſe

Theſe veſiculary Polypes, as ſoon as they arrive at Maturity fall off, and with them moſt of the Veſicles diſappear.

In ſome of the celliferous Corallines, which branch out in an elegant Manner, we obſerve, that the ſmall Polypes in the Cells acquire a teſtaceous Covering, like little Snails, as at Fig. *E* and *B*, in Plate XVIII. and at Fig. *A*, in Plate XIX.

Theſe little Shell-fiſh, we may ſuppoſe, grow larger; and, in their mature State, may depoſite on Rocks, *Fucus's*, and Shells, ſuch curiouſly implicated *Matrices* or Ovaries, which, in time, may unfold and extend themſelves into thoſe many beautiful Tree-like Forms that we find them in.

The *Matrices* of ſome Kind of Shell-fiſh are ſo remarkable for their Plant-like Form, that many People have taken them for Vegetables at firſt Sight. See Fig. *a*, Plate XXXIII.

In order therefore to be more fully ſatisfied, in reſpect to the Nature of a Species of Beings hitherto almoſt unknown, I took a Journey in *Auguſt* laſt 1754, along the Northern Shore of the County of *Kent*, in Company with Doctor *Oeder*, a very curious and ingenious Phyſician, Profeſſor of Botany to the King of *Denmark*.

At *Whitſtable*, I employed ſome Fiſhermen to collect what Varieties they could of theſe ſubmarine Bodies. Among many other things they brought me ſeveral irregular Pieces of a fleſhy Subſtance, ſticking to Shells, called by them, Deadman's Toes. It is deſcribed in *Ray*'s *Synopſis*, by the Name of *Alcyonium ramoſo-digitatum molle aſteriſcis undiquaque ornatum*. A ſmall Piece of it is repreſented in its natural Form, at Letter *a*, Plate XXXII. and a Part of it magnified at Letter *A*.

Theſe the Fiſhermen brought me, with the other Sea-Productions, in Buckets of Sea-water; we left them undiſturbed for ſome time, till the Polypes had extended themſelves out of their ſtarry Cells, in which their Tails were fixed; and then took them ſuddenly out of the Salt-water, and inſtantly plunged them into Brandy, whereby many of their Bodies were kept from ſhrivelling up, and ſhrinking back into their ſtarry Retreats. By this Means I preſerved not only theſe, but ſeveral other Marine Productions, with their Animals, in their natural Form; particularly the *Alcyonium*, like the Lobes of the Lungs, deſcribed Plate XVII. at *b*, called by the Fiſhermen the Sea Fig, from its having many yellow Seed-like Particles in the Inſide. The Outſide of this, when magnified, appeared full of ſmall Stars, as deſcribed at *B*, *C*, and *D*, in the ſame Plate.

It was here I firſt obſerved the Animal alive in the Sea-briſtle Coralline, as deſcribed at Plate XI. Letter *A*. And that of the Herring-bone Coralline, at Plate X. Letter *A*; with thoſe on the branched tubulary Coralline, Plate XVII. Letter *A*, where they are magnified. Here we ſaw the Animals on the Celliferous Coralline, as magnified in Plate XX. in Letter *C*. Several of theſe Animals I found well preſerved in the Spirits after my Return, notwithſtanding they were crouded into the Bottle with many other Sorts of a coarſer Texture, ſuch as Star-fiſh, *Alcyoniums* on Shells, *&c.*

Finding upon my Arrival, that I could diſtinguiſh the true natural Appearance of many Species of Corallines, with their Animals, by being preſerved in Spirits, I thought it might be ſatisfactory to know the Method I had fallen upon for this Purpoſe; and, accordingly, recommend the following to thoſe, who are deſirous of obtaining Varieties of theſe Corallines,

Corallines, and other Sea-productions, from their Friends on the Sea-coaſts, in great Perfection.

The greateſt Variety of Corallines are to be found on what are generally called Rock-Oyſters, or upon thoſe Beds of Oyſters that have been for ſome time diſuſed or neglected. Upon ſuch I have ſeen them grow, as it were in little Groves. As ſoon as the Fiſhermen take theſe Oyſters out of the Sea, let them immediately put them into Buckets of Sea-water; for the Animals are of ſo tender a Nature, that the Air ſoon ſhrivels them up: As ſoon as they can conveniently, let them be brought on Shore, and ſtripped off the Shells with a Pair of Pincers, taking hold of them near where they adhere to the Shells: Then put them gently into white earthen Plates full of clear Sea-water; and in about an Hour, or perhaps leſs, they will begin to recover from this rough Treatment; and many of the Animals will begin to extend themſelves; this you may obſerve by a magnifying Glaſs of about Two Inches Focus. Thoſe that you perceive extended, and alive, may be ſuddenly taken out with the Pincers, and inſtantly immerſed in any kind of Spirits, which you muſt have by you in an open Veſſel for that Purpoſe. This will fix the Animals in ſuch a Manner, that, when they are put into wide-mouthed ſtrong Glaſs-Bottles full of the ſame Spirits, and well corked, many Varieties may be ſent together to a great Diſtance, without Prejudice to the Figure of the Animals, as I have experienced.

Or this Method may be tried; that is, to place the Oyſters with the Corallines on them, in broad earthen or wooden Veſſels, with as much Sea-water over them as will barely cover them; let them reſt an Hour, and then pour boiling Water gently by the Side of the Veſſel, to about the ſame Quantity that there was of cold Water in the Veſſels.

Immediately

Immediately afterwards pluck the Corallines off the Shells, and put them in Bottles of Spirits as before. When they are received, in order to be examined, you muſt provide long narrow Bottles of Chryſtal-glaſs to put the different Sorts in; theſe muſt have wide Mouths, and be filled with the cleareſt Spirits, but not ſtronger than Proof-Brandy; and of ſuch a Diameter as ſhall be agreeable to the Focus of the Glaſs you propoſe to examine them by. If theſe Bottles are properly ſtopped to prevent the Spirits evaporating, it will be the beſt Method I know of keeping theſe extraordinary Plant-like Animals in a Condition capable of convinceing the moſt incredulous of their Nature and Origin.

It will be neceſſary to inform the Curious, that Experiments of this Kind ſucceed beſt in warm Weather; the Animals being generally found contracted and torpid during the Winter-Seaſon.

The foregoing Obſervations, on the Nature of the Veſiculated and Celliferous Corallines, gave me the firſt Hints into the Formation of the *Keratophyta*; which was the more ſatisfactory to me, as this Claſs of Beings ſtill paſſes among very ſenſible and curious Naturaliſts for mere Vegetables, but incruſted over by Accident, like many other Plants, with the Neſts of certain Species of Inſects peculiar to ſuch particular Kind of Plants.

In the Cabinets of the Curious, we meet with Specimens of ſome Species of theſe *Keratophyta*, ſo nearly allied to ſome of our veſiculated Corallines, with large Denticles, that they ſeem to claim an Alliance to both Claſſes. One of theſe is deſcribed in Plate XXVI. at Fig. *S*.

The reſt of this Claſs of *Keratophyta*, I found to correſpond with the Veſiculated and Celliferous Claſſes, in ſuch material Points, as left me no Room to doubt, but that, if one

one was of an animal Nature, which ocular Demonſtration had already convinced me of, then the other muſt be ſo too.

And, I am perſuaded, that whoever compares them together, and views attentively the Succeſſion of riſing Tubes, that change inſenſibly into Ramifications of Cells in the *Keratophyton*, and, at the ſame time, examines the Structure of that Veſiculated Coralline, called the Herring-bone Coralline, Plate X. Fig. *a*, &c. will be of my Opinion. How the woody or horny Part of the Stem and Branches are formed, ſeems to be the great Difficulty to the curious Enquirer to account for, unleſs he is allowed to ſuppoſe it a Vegetable.

But, during theſe Obſervations, I fortunately received from *America*, a curious Specimen of a Sea-Fan, Part of which is delineated in Plate XXVI. Fig. *C*, *O*, *D*, *K*, which plainly demonſtrates, that Animals of the Polype-kind are the Fabricators both of the horny or woody, as well as the calcarious, Covering of this curious and numerous Plant-like Colony of Inſects.

The next Claſs, which is the *Eſchara*, deſerves our Notice, and a nicer Scrutiny. There appears a great Probability of ſome of theſe being the *Matrices* or Ovaries of certain Species of Shell-fiſh, perhaps of the Bivalve Kind.

So little Enquiry has yet been made into the Origin of Shell-fiſh, that we ſeem ſtill ignorant of the Production, or firſt Beginning even of the moſt common Sorts among us, ſuch as Oyſters, Cockles, and Muſſels.

Many of the *Alcyoniums*, or thoſe miſhapen Sea-productions called ſo, deſerve our Attention. If we could examine theſe Bodies carefully, at different Seaſons of the Year, I do not in the leaſt doubt, but they would amply reward our Curioſity with a Fund of new Diſcoveries.

As

As we ſhall frequently have Occaſion, in the enſuing Work, to make Uſe of the Term *Polype*, it will be neceſſary to give the Reader, who may be unacquainted with theſe Subjects, ſome Idea of it; which, perhaps, may be done the moſt ſatisfactorily, by deſcribing the Freſh-water Polype, whoſe extraordinary Properties have been ſo fully enquired into by the ingenious Mr. *Trembley*, F. R. S.

In Plate XXVIII. at Fig. *C*, is exhibited a long-armed Freſh-water Polype of this Author: From this Repreſentation the Reader will eaſily know what is intended, when we ſpeak of the Marine Polype, its Arms, Claws, &c.

This Animal then is, firſt, of a Worm-ſhaped Figure, and of the ſame Kind of tender Subſtance with the Horns of the common Snail: It adheres by one End, like a Sucker, to Water-plants and other Subſtances. The other End, which is the Head, is ſurrounded by many Arms or Feeders, placed like Rays round a Centre; this Centre is its Mouth; and with theſe tender Arms, which are capable of great Extenſion, particularly in this Species, it ſeizes minute Worms, and various Kinds of Water-Inſects, and brings them to its Mouth; and often ſwallows Bodies larger than itſelf; having a ſurprizing Property of extending its Mouth wider, in proportion, than any other Animal. After its Food is digeſted in its Stomach, it returns the Remains of the Animals it feeds on through its Mouth again, having no other obſervable Emunctory.

In a few Days there appear ſmall Knobs, or *Papillæ*, on its Sides: As theſe increaſe in Length, little Fibres are ſeen riſing out of the Circumference of their Heads, as in the Parent Animal, which Fibres, they ſoon begin to uſe, for the Purpoſe of procuring Nourihment, &c. When theſe are arrived

arrived at mature Size, they ſend out other young ones on their Sides in the ſame Manner; ſo that the Animal branches out into a numerous Offspring, growing out of one common Parent, and united together and diſpoſed in the Manner repreſented in Plate before-mentioned, Fig. *C:* Each of theſe provides Nouriſhment not only for itſelf, but for the whole Society; an Increaſe in the Bulk of one Polype by its feeding, tending to an Increaſe in the reſt.

Thus a Polype of the Freſh-water Kind becomes like a Plant branched out, or compoſed of many Bodies, each of which has this ſingular Characteriſtic, that if one of them is or cut in Two in the Middle, the ſeparated Part becomes a complete Animal, and ſoon adhering to ſome fixed Baſe, like the Parent from whence it was ſeparated, produces a Circle of Arms, a Mouth is formed in the Centre; it increaſes in Bulk, emits a numerous Progeny, and is, in every Reſpect, as perfect an Animal as that from which it was ſevered.

Much after the ſame Manner, ſo far as hath hitherto been diſcovered, the marine Polype, however different in reſpect to Form, is nouriſhed, increaſes, and may be propagated; having often found, in my Enquiries, that ſmall Pieces cut off from the living Parent, on account of viewing the ſeveral Parts more accurately, ſoon give Indications, that they contain not only the Principles of Life, but likewiſe the Faculty of increaſing and multiplying into a numerous Iſſue.

TRANSLATION of the *Latin* Deſcriptions, with References to the CONTENTS of the PLATES.

Veſiculated Corallines.

N°. 1. *VESICULATED Coralline, with alternate Branches thinly diſpoſed, and Denticles of a cylindrical Shape, placed oppoſite to one another, with open and ſcolloped Apertures.* Plate I. page 4.

N°. 2. *Sea Coralline, in the Shape of a Fir-tree, or Sea Moſs, like a Fern Leaf.* Id. ib.

N°. 3. *Coralline with few Branches, having its Denticles alternately placed, and bearing Veſicles that are wrinkled acroſs.* Plate II. p. 5.

N°. 4. *Moſs-like Coralline, with its Stem ſurrounded by many minute tufted Branches, and its Denticles placed alternately.* Id. p. 6.

N°. 5. *Coralline like a Cypreſs-tree, with blunt Denticles not exactly oppoſite, having many minute looſe Branches proceeding from its Stem, and bearing Veſicles with two Points.* Plate III. p. 7.

N°. 6. *Trailing moſſy Coralline, having very ſlender Stalks with oppoſite Denticles.* Id. p. 8.

CONTENTS.

N°. 7. *Small feathered Coralline, with white, tender, and oppoſite Denticles, bearing Veſicles reſembling the opening Flowers of the Lily or Pomegranate.* Plate IV. p. 8.

N°. 8. *Little creeping Coralline, having but few Branches, and the Denticles united in Pairs.* Plate V. p. 9.

N°. 9. *Veſiculated Coralline, with a ſtiff indented Stem ending in a Tuft of forked Branches at the Top, and with Denticles lying flat upon the Branches.* Id. p. 10.

N°. 10. *Erect pennated Coralline, with Denticles lying flat on the Branches, reſembling Spleenwort or Polypody.* Plate VI. p. 11.

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Errata

ERRATA.

Wherever the Word *Tentaculi* occurs, read *Tentacula.*

Page 10. line 22. place a *Comma* after *Terminantibus.*
11. line 3. for Fig. 6, read Fig. *b.*
20. Margin, for Fig. *a A*, read Fig. *b B.*
23. line 20. for *Equiſitiformibus*, read *Equiſetiformibus.*
30. lines 11. 12. for *Laryngæ*, read *Laryngi.*
30. line 13. for *tubulous* read *tubular.*
31. line 26. for Plate XXXV. read Plate XVII.
33. line 16. for Fig. *a*, read Fig. *a* 2.
36. line 10. place the *Comma* that follows *teſtaceas*, after *parte.*
39. line 16. after *Colore eburneo* put a *Comma.*
63. line 18. for Fig. *c*, read Fig. *C.*
88. Margin, for XXIII. read XXXIII. and line 28. for *C* read *a.*

By Miſtake, there are two CHAP. V's, ſo that the Chapters ſhould follow regularly to Nº. XI. inſtead of Nº. X.

AN

ESSAY

TOWARDS A

NATURAL HISTORY

OF

ENGLISH CORALLINES, &c.

CHAP. I.

IN order to be the better underſtood, in treating of the ſeveral marine Productions, which are the Subject of the following Eſſay, I find myſelf under a kind of Neceſſity to ſpeak in the common Language of thoſe, who, conſidering them merely as Plants or marine Vegetables, have, as Botaniſts, reduced them to certain Claſſes; and, with the celebrated *Ray*, ſhall divide them into *Corals*, *Corallines*, *Keratophyta*, *Eſchara*, *Sponges*, and *Alcyonia*. But in diſpoſing of the ſeveral Subjects, I ſhall rather have Regard to the ſimilar Texture of the Subſtances, and the Figure of the Animals that inhabit them, than to the mere external Form and Appearance, which were the ſole Objects of the botanical Writers.

According to this Method, it might be expected that Corals ſhould be ranged and deſcribed firſt: But of theſe we have ſo few on the Coaſts of *England* and *Ireland*, and the Texture of them ſo complex, that what I ſhall have to ſay concerning them will be better underſtood, after the more ſimple Productions have been deſcribed.

I ſhall therefore firſt proceed to the *Corallines*, by which may be underſtood thoſe ſubmarine plant-like Bodies, that conſiſt of many ſlender, finely divided, and jointed Branches, reſembling ſome Species of Moſs, and under which Appellation they have been deſcribed by the Botaniſts.

Theſe differ from Sea-Plants in Texture, as well as Hardneſs, and likewiſe in their chymical Productions. For Sea-Plants, properly ſo called, ſuch as the *Algæ*, *Fuci*, &c. afford in Diſtillation little or no Traces of a volatile Salt: Whereas all the Corallines afford a conſiderable Quantity; and in burning yield a Smell ſomewhat reſembling that of burnt Horn, and other animal Subſtances: Which of itſelf is a Proof that this Claſs of Bodies, tho' it has the vegetable Form, yet is not intirely of a vegetable Nature.

In treating of theſe Corallines, in order to preſerve ſome kind of Method, we ſhall divide them into the Veſiculated, the Tubular, the Celliferous, and the Articulated Kinds.

All theſe are ranked by *Linnæus* under the Title of *Sertularia*, in his Claſſes of the coral-like Bodies.

Before we proceed, it is neceſſary to obſerve, that the Deſcriptions here given are, for the moſt part, taken fr
rallines which have been brought from a conſidera
ſtance; tho' no Pains have been ſpared to procure t
recent

recent as poſſible from the Sea, and to examine them on the Shores whenever Opportunity offered.

The veſiculated Corallines are diſtinguiſhed by their horny hollow Ramifications, which are diſpoſed in a Variety of elegant plant-like Forms; moſt of them are furniſhed with little Denticles on their Branches, like Leaves on Moſſes; and at certain Seaſons of the Year, we find on them particular-ſhap'd ſmall Bodies like Bladders, that proceed from different Parts of their Stems and Branches, each being of a peculiar Form, according to the different Species.

Their Colour, when dry, is for the moſt part of a yellowiſh or pale brown.

When they are immerſed in Water, they recover the ſame Form they appeared in when freſh in the Sea; and ſoon become filled with the Liquid. This gives them a ſemi-tranſparent Amber-colour, and makes them very elaſtic. They are found adhering to Rocks, Shells, and Fucus's, by ſmall root-like Tubes. When they are put into Vinegar they cauſe no Effervescence.

CHAP. II.

Of the Veſiculated Corallines.

Plate I. Fig. *a. A.* N°. 1. *Corallina veſiculata ſparſim et alternatim ramoſa, denticulis oppoſitis cylindricis, oribus crenatis patulis.* Sea-Tamariſk.

This curious Coralline was taken up in very deep Water, near the Iſland of *Dalkey*, at the Entrance of the Harbour of *Dublin*. Its Ramifications are irregular, but chiefly alternate: Its Texture is of a thin tranſparent horny Nature: The Denticles are large, cylindrical, open, and oppoſite; and each Pair ſeems fixt in the Top of the next Pair below it.

The Veſicles appear to be ſhaped ſomething like a Heart, with a ſhort Tube at the Top, not unlike the *Aorta*, or *Vena cava* cut off, as it is repreſented in the magnified Part, Fig. *A*, Plate I.

N°. 1. Fig. *a*, in the ſame Plate, ſhews the natural Size of a Part of this Coralline: And at Fig. *A* the Denticles are magnified by the fifth Glaſs of *Wilſon*'s ſingle Microſcope.

Plate I. Fig. *b. B.* N°. 2. *Corallina marina Abietis forma.* Tournf. I. R. H. 571. *Muſcus marinus Filicis folio.* H. Ox. Vol. III. p. 65. Tab. 9. Fig. 1.
Sea-Fir.

This Coralline adheres to Oyſters, Muſcles, and other marine Subſtances, by wrinkled tubular Roots; which riſing into many ſtiff, hollow, and horny Stems, throw out alternate regular

Plate 1

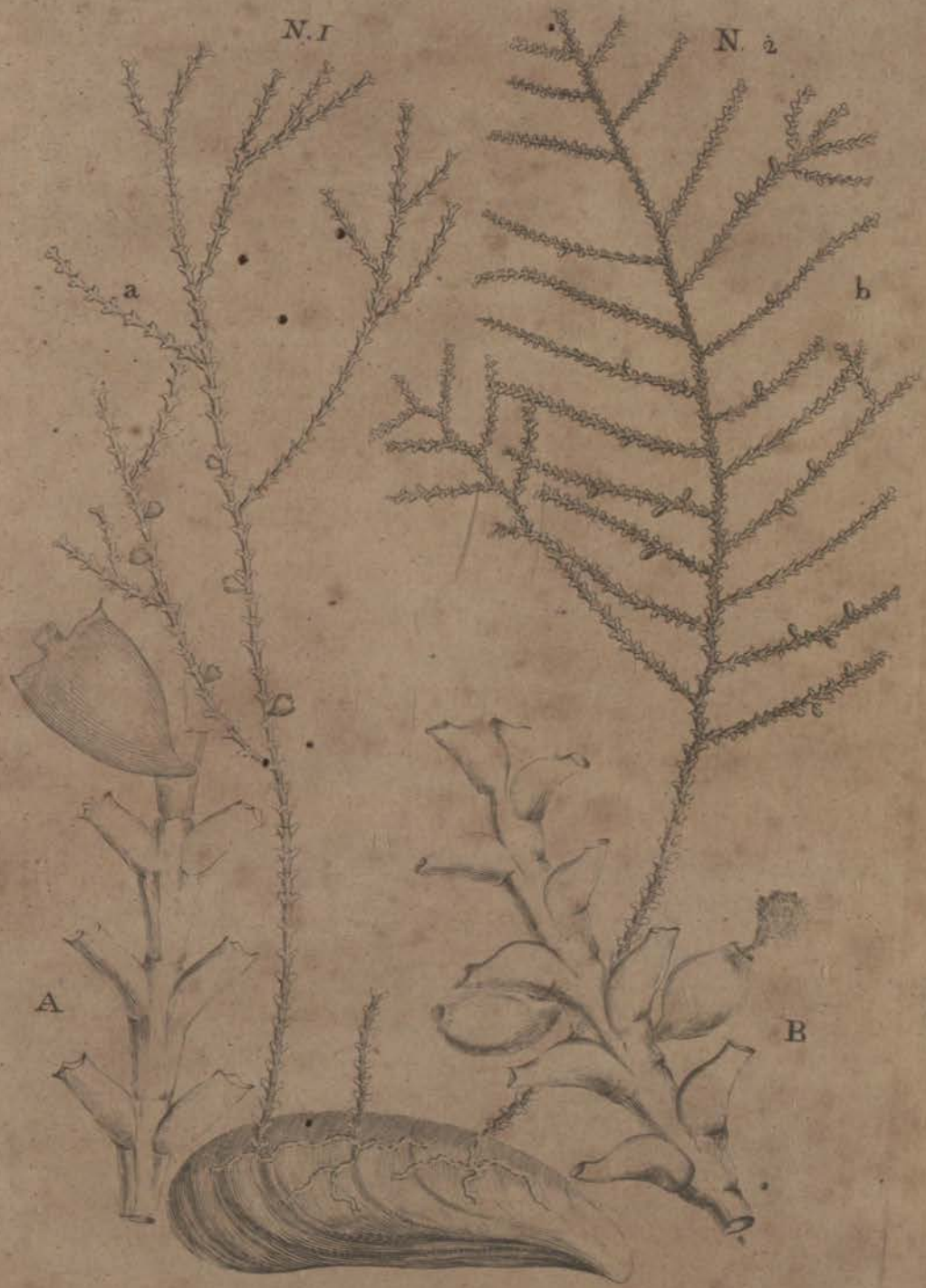


Plate II

regular Branches, that have the Appearance of the Fir-tree, or, as ſome think, of the Fern; the Branches of this extending themſelves in the ſame Direction with the Leaves of that Plant.

The Denticles are placed alternately, and have narrow Mouths or Openings. On ſeveral Parts of this Coralline we may obſerve oval-ſhap'd Veſicles, or little Bladders, which are inſerted in the Stem, and have a Communication with the internal Part, by a ſmall Opening at the Bottom of each. Their Necks are narrow near the Top, like a Pitcher; and, in ſome Specimens collected in the Month of *April*, we have obſerved the Remains of Animals like Polypes, fixed by the Tail to the Inſide of the Neck of theſe Veſicles, as in Plate I. Fig. *B.* where the dead Polype may be ſeen hanging out of the Veſicle. Many Specimens of this Species are found of a reddiſh Colour; tho' almoſt all the Corallines are of a fading yellow or brown Colour. We often find ſome of this Species full of white ſpiral Shells, like a minute *Cornu Ammonis*; and others over-run with a ſmall bell-ſhap'd Coralline, which will be deſcribed hereafter.

Plate I. N. 2. Fig. *b*, repreſents the natural Size and Manner of the Growth of this Coralline upon a Muſcle-ſhell. Fig. *B* repreſents a ſmall Piece of it magnified.

N°. 3. *Corallina minus ramoſa alterna vice denticulata, Vc. ~~Lenti~~culis lineis tranſverſis externe ſtriatis.* R. S. p. 35. N°. 13. Plate II. Fig. *a. A. b. B.*

Great Tooth Coralline.

There are two Species of this Coralline; the one upright, the other more branched and climbing.

The

The firſt ſort is found in Plenty, growing erect on Oyſters, near *Queenborough* in the Iſland of *Sheppey*. This is very little branched; the Stem is ſlender, and twiſted a little between the Denticles like a Screw: The Denticles are large, pitcher-ſhaped, and placed alternately. When this Coralline was taken out of the Sea at *Queenborough*, and kept immerſed a little time in Sea-water, I obſerved, through the Microſcope, a Polype occupy the Inſide of the whole, and each Denticle filled with a Part of it, ending in Tufts of *tentaculi*, or fine hair-like Claws, as expreſſed in Plate II. Fig. *A.* moving about very ſwiftly. The Veſicle is added here, to ſhew its magnified Proportion to the Denticles; but the Animal was dead in it.

At Fig, *a*, N°. 3. in Plate II. is a Muſcle-ſhell, with ſeveral Sprigs of this Coralline, juſt as it is found adhering to it. A ſmall Piece of one of theſe little Sprigs was put into a Watch-glaſs of Sea-water; and, notwithſtanding the Separation of its Body, in five Minutes time the Claws were moving about in ſearch of Prey.

The other Species, which is the climbing one, is more branched, the Denticles are placed more aſunder, and their Mouths are wider: The Veſicles of both Species are wrinkled.

Fig. *b*, in Plate II. ſhews the natural Appearance of this climbing up another Coralline. Fig. *B* ſhews a Piece of it with its Veſicle magnified.

Plate II. Fig. *c. C.* N°. 4. *Corallina muſcoſa alterna vice denticulata, ramulis in creberrima capillamenta ſparſis.* R. S. N°. 17. pag. 36.

Squirrel's Tail.

On all the Shore to the Eaſtward of *Sheerneſs* in the Iſland of *Sheppey*, this beautiful feather'd Coralline is very common;

Plate III

mon; on account of the Fiſhermen's plucking it off the Oyſters; for it grows upon them in great Plenty, eſpecially on what they call the Rock Oyſters.

It generally grows erect, with thick Tufts of alternately denticulated Ramifications, placed in a ſpiral or ſcrew-like Order round the Stem from Bottom to Top. N. 4. in Plate II. Fig. *c*, repreſents the natural Size. Tho' the Denticles are in Pairs, they are not exactly oppoſite; they are pointed, and turn a little inwards, like the Horns of a Bull (See the magnified Branch at Fig. *C*, Plate II.). The Veſicles are ſhaped like Vaſes, and are often found empty and tranſparent; but in Spring they are brought us full of a yellow viſcid Subſtance; which, from its Likeneſs to the known Contents of the Veſicles of other Corallines, muſt be dead Animals.

N°. 5. *Corallina Cupreſſi forma, denticulis obtuſis, paululum alternis, ramulis in exigua et rariora capillamenta ſparſis, veſiculis bidentibus.* Plate III. Fig. *a. A.*

Sea-Cypreſs,

This Coralline, which has a near Affinity to the laſt, is found in deep Water on the Northern Coaſts of *England* and *Ireland*; and differs from the former in having blunt Teeth or Denticles, which are not curved, but ſtrait, and more cloſely united on one Side to the Stalk.

The Branches are longer and thinner, and the middle Stem thicker than the former (See the natural Size in Plate III. at N. 5. Fig. *a*.). The Veſicles have two ſharp Points, at the Top of each, and contain the ſame ſort of Subſtance with the former. See Fig. *A*, Plate III. where a ſmall Branch with the Veſicles is magnified, with a dead Polype adhering to one of them.

Plate III. Fig. *b. B.* N°. 6. *Corallina muſcoſa denticulata procumbens, caule tenuiſſimo denticellis ex adverſo ſitis.* R. S. p. 36. N°. 13.
Sea-Hair.

This very neat and moſt regularly formed Coralline conſiſts of long trailing Branches, with very ſharp Teeth, placed in Pairs exactly oppoſite: Each Pair ſeems to be jointed into the next. The ſlender Branches grow in Tufts, like Bunches of Hair. See Plate III. N. 6. Fig. *b.* This gives you the natural Appearance of it. The Veſicles of theſe are remarkably large and tranſparent, with regular Covers; the whole not unlike to China Jars.

Fig. *B.* Plate III. gives us the Repreſentation of a Branch with its Veſicle magnified.

The Cover to the Veſicle of this Species, in Form has ſome Reſemblance to the *Operculum* of thoſe kinds of Land-Moſſes, which are called *Hypnum* and *Bryum.*

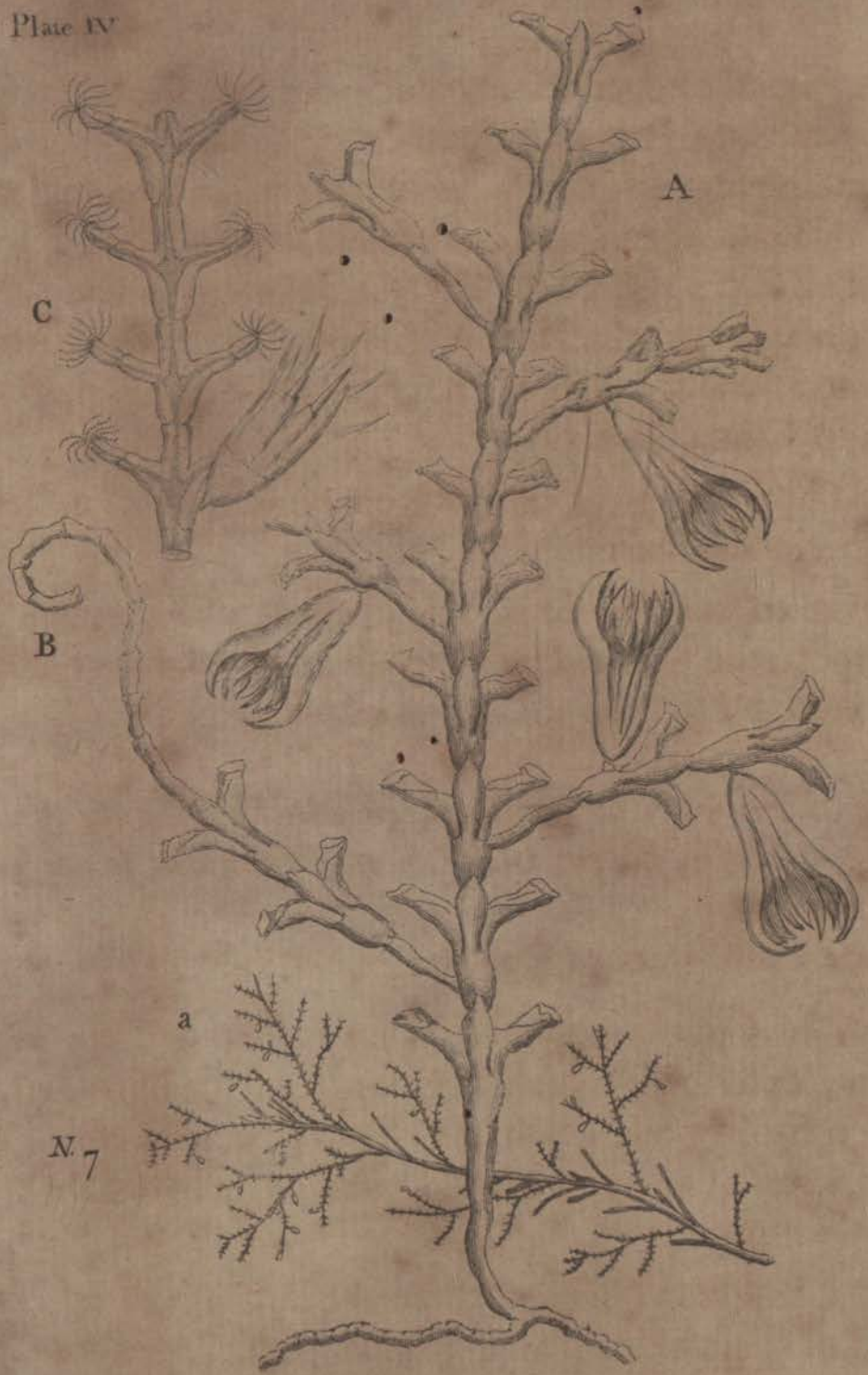
Plate IV. Fig. *a. A.* N°. 7. *Corallina pumila pennata, denticulis teneris, albis, et oppoſitis; veſiculis, florem lilii, vel mali punicæ, ſe expandentem referentibus.*
Lily or Pomegranate flowering Coralline.

This curious Coralline is often found on the Cypreſs Coralline before deſcribed, which it embraces with its *tubuli*, and from thence throws out Branches, furniſhed with ſlender oppoſite Denticles, of a cylindrical Form, which, as they dry, ſink in at the upper Part.

At N. 7. in Plate IV. Fig. *a*, there are ſome ſmall Specim repreſented of their natural Size growing upon another Cor line.

The Veſicles, when magnified, are ſhaped like a Lily Pomegranate-flower juſt opening; and appear more like Bloſſo

Plate IV



N. 7

Bloſſom, than any belonging to the whole Tribe of Coralines.

Fig. *A*, is the magnified Appearance of a ſmall Branch of this Coralline with its curious Veſicles.

In this magnified Branch, at *B*, we may obſerve, that the Branches of this Coralline now-and-then terminate in irregularly contorted *tubuli*, not unlike thoſe it begins with.

I obſerved at *Brighthelmſtone* many Specimens of this Species adhering to Oyſter-ſhells, and growing erect upon them; theſe were brought to us in a recent State, juſt taken out of the Sea. I took a very minute Branch from one of them, together with its Veſicles, and plac'd it in Sea-water upon the Stage of my Microſcope, and in a very ſhort time I found the Animal in the Branch alive, extending its *tentaculi* or claws out of all its Denticles, but the Animal in the Veſicle was contracted, and did not appear to move.

Fig. *C*, gives the Appearance of this Branch in the Microſcope. Here the Spines, which were folded up in the Veſicles of the Branch at Figure *A*, are all extended in the Figure *C*.

N°. 8. *Corallina pumila repens minus ramoſa, denticellis bijugis.* Plate V. Fig. *a. A.*
R. S. N°. 19. p. 37.
Sea-Oak Coralline.

This little creeping Coralline ariſes here and there from ſmall thready *tubuli*, which run along the Surface of the broad-leaf'd indented Sea-Oak *Fucus*. This is found in great Plenty on the Sea-ſhore near *Sheerneſs* in the Iſland of *Sheppey*. The ſame Coralline is found ſometimes creeping on the ſiliquoſe or podded *Fucus*.

The Denticles are blunt at the Openings, and placed in Pairs exactly oppoſite to each other; each Pair ſeems to be

jointed in the next: The Veſicles are almoſt globular, and are often found wrinkled or furrow'd acroſs. Fig. *a*, N. 8. gives the natural Appearance of it creeping on the Sea-Oak *Fucus*. Fig. *A*, in the ſame Plate, ſhews a Branch of it with the Veſicles magnified.

Whilſt I was on the *Suſſex* Coaſt at *Brighthelmſtone*, I firſt perceived the Polypes alive in the Veſicles of the denticulated Claſs of Corallines, and particularly in this. Theſe Animals are of a much larger Size in the Veſicles than thoſe in the Denticles. They are protruded or grow out irregularly here and there, with their Veſicles, from the Sides of the Stem and Branches. We can eaſily diſtinguiſh them in the Microſcope to be united to the Body of the Parent Polype; which ſeems to conſiſt of Links of ſmall Polypes in Pairs, each Pair connected to other Pairs by a fleſhy Line, that runs through the Middle of the Coralline. Here we ſaw the ſmall Polypes of this Species extending their Claws in ſearch of Food, as well as thoſe of the veſiculated kind.

Fig. *A*, deſcribes them as they appeared in the Microſcope while recent.

Plate V. Fig. *b. B.* N°. 9. *Corallina veſiculata, caule angulato rigido, ramis denſe ſtipatis et bifurcatis, terminantibus denticulis cauli appreſſis. Fucus Equiſeti facie, Oſtreæ Teſtæ adnaſcens.*

Sibbald. Scot. Ill. L. 1. p. 56. Tab. 12.
R. S. N°. 47. p. 50.

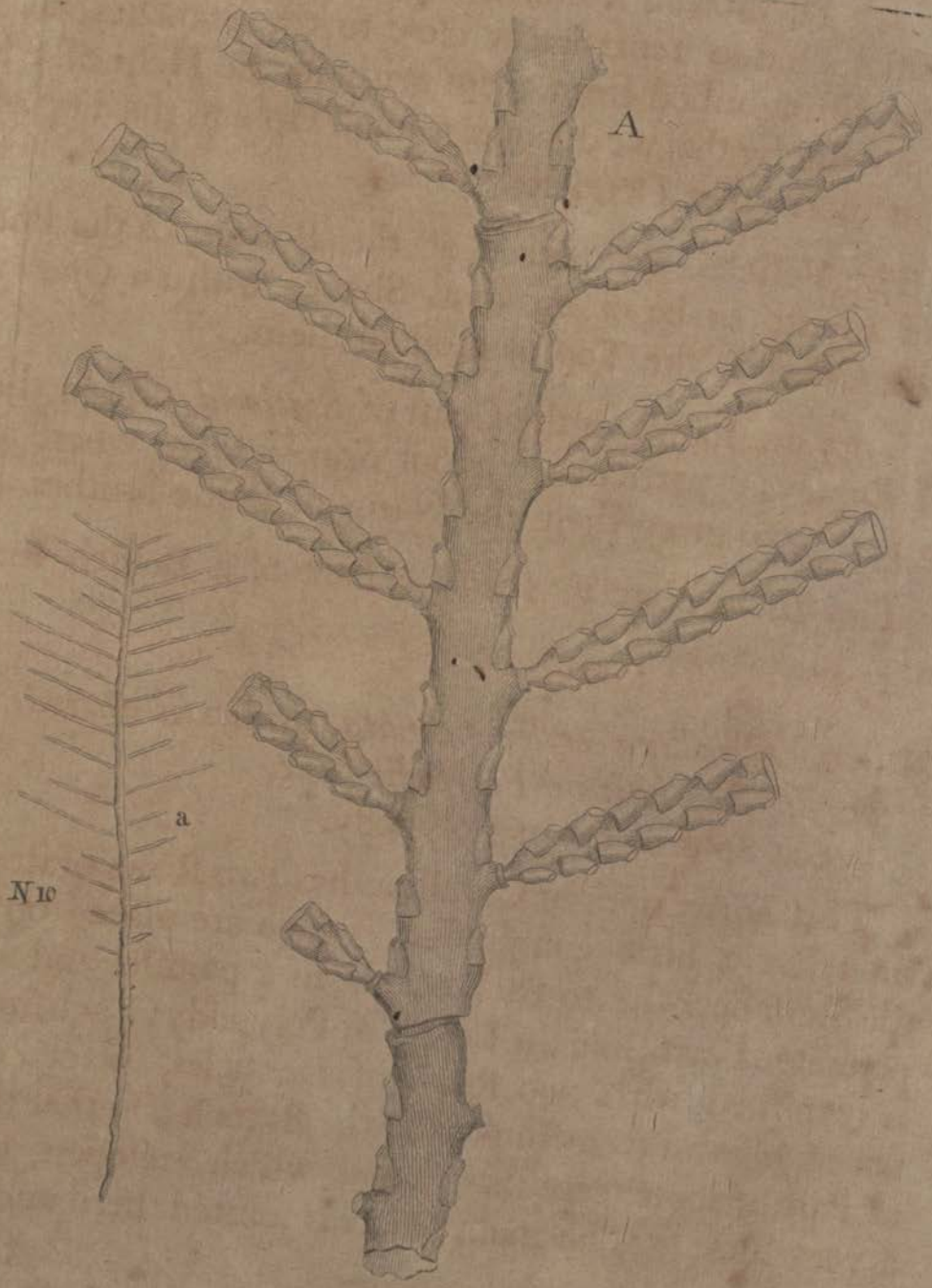
Bottle-bruſh Coralline.

This Coralline ariſes from horny *tubuli*, which ſtrongly adhere to Sea-ſhells.

The Stalk is erect, ſtiff, and full of Knots, terminating the alternate Angles, which ſeem to be the Ends of Branches broken off.

Plate V

Plate VI



It is generally found with a thick Tuft of ſhort Branches, growing cloſe together on the upper Part of the Stem. See its natural Size at N. 9. Fig. 6.

Each Diviſion of a Branch has two Prongs or Horns. The Denticles lie ſo remarkably cloſe to the Branches, as ſcarce to be diſtinguiſhed from them without the Help of a Microſcope: But by this we diſcover a ſmall Hole in the Top of each, as in moſt other Denticles.

The Veſicles are placed at the Bottom of the Branches; and appear to be of an oval Shape, with an *Operculum* or little Cover at the Top of moſt of them.

They are found on the Coaſt of *Scotland*, and in the North of *England*; particularly about *Scarborough*, where the Fiſhermen have given them the Name of Bottle-bruſhes.

Fig. *B*, in Plate V. ſhews a Part of a Branch magnified, with its Veſicles.

N°. 10. *Corallina erecta pennata, denticulis alternis cauli appreſſis, Lonchitis vel Polypodii facie.* Plate VI. Fig. *a. A.*

Sea Spleenwort or Polypody.

This horny upright Coralline has two Rows of ſtrait hollow Branches a little compreſſed, which are placed on the middle Stem oppoſite to each other, in a parallel and alternately pennated Form, like the Leaves of Polypody: Each ſmall Branch is furniſhed with two Rows of Denticles, placed alternately oppoſite, and ſeem ſunk into the Branch; ſo that they appear as Part of it; except their Tops, which are open, and project a very little. The main Stem is jointed here and there like a Reed.

The natural Size is repreſented at N°. 10. Fig. *a*.

Fig. *A*, in the ſame Plate, ſhews a Part of it magnified.

I have not yet received any Specimens with Veſicles, ſo perfect as to be able to deſcribe them.

This was lately taken up, among other Sea Productions, by the Fiſhermen near the Harbour of *Dublin*.

Plate VII. Fig. *a. A.* N°. 11. *Corallina Muſcoſa pennata ramulis & capillamentis falcatis.* R. S. N°. 16. p. 36.
Sickle Coralline.

This elegant feathered Coralline adheres to Rocks and Shells by little wrinkled Tubes, and riſes from thence into erect waved Stems, which are ſurrounded from Bottom to Top with pennated Branches; the ſmaller Diviſions of theſe have Rows of little Denticles, or Teeth, on the Side; and bend inward, as they become dry, in the Form of a Sickle.

Fig. *a*, N°. 11. repreſents the natural Appearance of this Coralline.

The Veſicles are nearly of an inverted oval Shape, broad at Bottom, and narrower at Top where the Opening is; ſome of them appear, as if they had a Calyx like a Flower at the Bottom of the Veſicle: Moſt of the dry'd Specimens, I have yet ſeen, have had an Orange-colour'd viſcid Subſtance in them, which ſeems of the ſame Nature with the Contents of the reſt.

Fig. *A*, is Part of a Branch, with its ſmaller Ramifications like Sickles, and its Veſicles magnified.

This Coralline is common on the Coaſt of *Kent*, near *Sheerneſs*, in the Iſland of *Sheppey*; and on the Shores of many other Parts of theſe Kingdoms.

N°. 12.

Plate VII.

N°. 12. *Corallina pennata & ſiliquata, denticulis florem lilium convallium referentibus.* Plate VII. Fig. *b. B.*

Pinnaria marina Imperati. Bocc. 257. N°. 6.

The Podded Coralline.

The little radical Tubes of this Coralline creep on, and adhere to Muſcles, and other Shells: From theſe ariſe little Branches like Feathers; each ſmaller Diviſion of a Branch is curved, when dried, like a Sickle; and the Denticles, which are fixed in a Row on the Inſide, are ſhaped, when magnified, like the Flowers of the Lily of the Valley.

This Coralline is alſo found ſurrounding the Stalks of the podded *Fucus*, with its tubulous Roots not adhering to, but incloſing it; as it is repreſented in its natural Size, at N°. 12. Fig. 6.

From the Branches ariſe little Pods encompaſſed by ſeveral ſtudded Ribs: On examining theſe Pods in the Microſcope, I have obſerved ſome looſe Particles, in ſome of them, like Seeds; but, upon diſſecting the thin membranaceous Coat of theſe tranſparent Pods, and more minutely examining the incloſed Subſtance with higher Magnifiers, it appeared of the ſame Kind and Conſiſtence with the Subſtance found in the Veſicles of other Corallines.

Fig. *B*, ſhews the Pods and Denticles, as they appear in the Microſcope.

This Coralline is found on ſeveral Coaſts of this Kingdom; but the Specimen with Pods was taken up by the Fiſhermen, on the Coaſt of *Ireland* near *Dublin*.

Plate VIII. Fig. *a*, *A*. N°. 13. *Corallina pennata & falcata, pennas caudæ Phaſiani referens caule gibboſo.*

Corallina fruticoſa pennata. Barr. Palma Marina. Barrel. Icon. 1292. n. 2.

Pheaſant's-tail Coralline,

This very rare Coralline grows to the Height of 10 or 12 Inches. The Root, or firſt Beginning, conſiſts of an irregular Tuft of extremely ſmall Tubes, appearing like a Piece of Sponge to the naked Eye: Several of theſe little Tubes, riſing together, and uniting in cloſe Contact, become a Stalk, which appears in the Microſcope curiouſly channel'd and indented: On the Back of the Stalk, at nearly equal Diſtances, are formed little regular arch-like Riſings, which are compreſſed and hollowed a little in the Middle.

Fig. *a*, N°. 13. in Plate VIII. ſhews the natural Appearance of this Coralline with its ſpongy Root.

The main Stem is now-and-then ramified; the Branches are pennated; and the *Pennæ*, or ſmall Diviſions of the Branches, turn one Way, and, when dry, are bent like a Sickle.

The Denticles are like Cups with an even Brim, fixed in Sockets, and placed all on the ſame Side one above another; the Openings, or Mouths, looking upwards.

Fig. *A*, ſhews the microſcopical Appearance of Part of the gibbous Stem, with the Figure and Poſition of the Denticles. No Veſicles have yet been diſcovered of this curious Coralline.

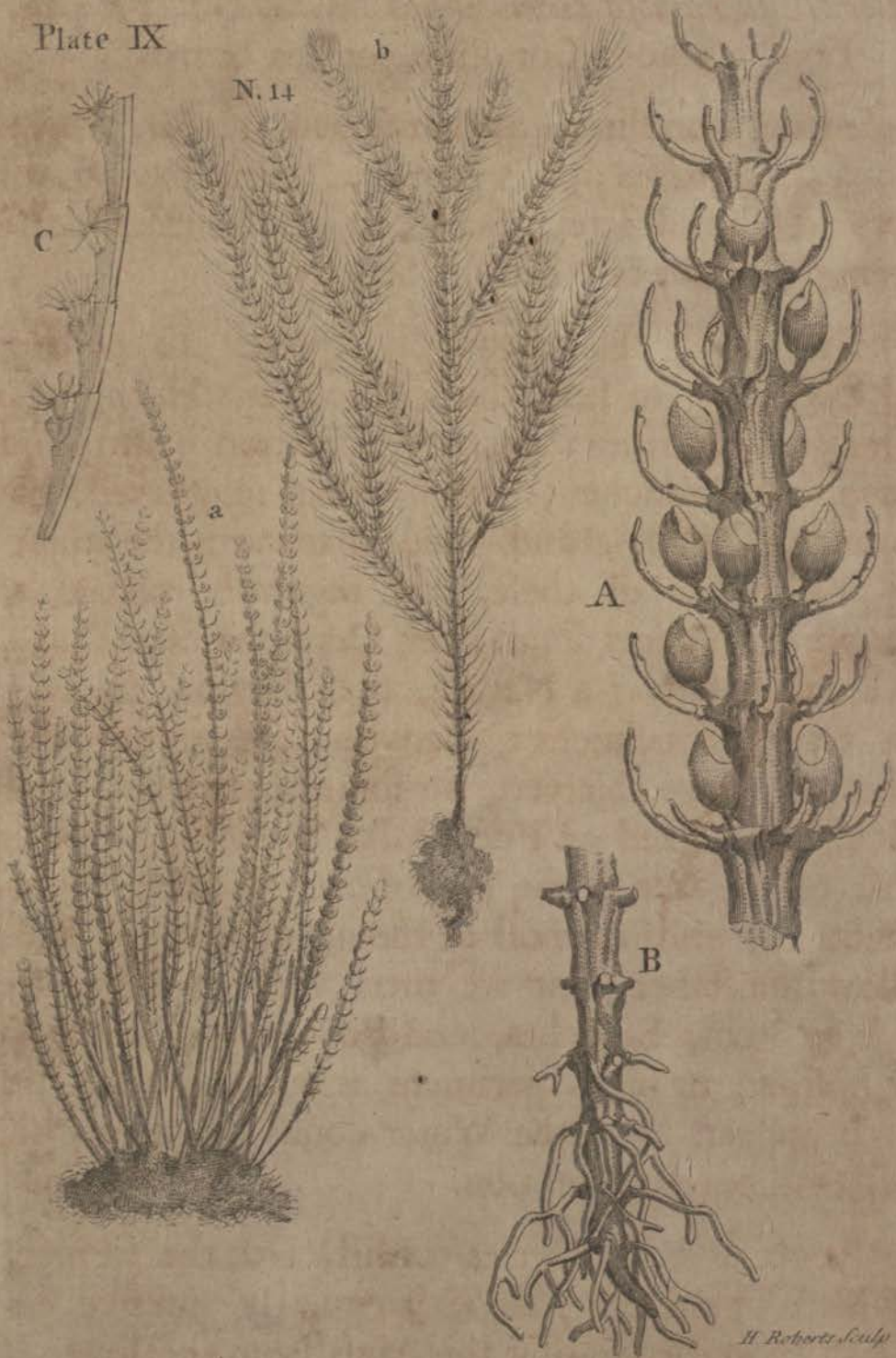
This was procured from the Fiſhermen that attend the *Dublin* Market; and was taken up in very deep Water on that Coaſt.

N°. 14.

Plate VIII

Plate IX

N. 14



N°. 14. *Corallina aſtaci corniculorum æmula.* R. S. N°. 10. pag. 34. And Plate IX. Fig. *a. A.*

Corallina ramoſa cirris obſita. R. S. N°. 11. pag. 35.

Lobſter's horn Coralline, or Sea-beard.

Theſe two Coralline, as mentioned by Mr. *Ray*, I find to be but one Species; It is probable, their having different Appearances, in different States, might be the Occaſion of their being thought two diſtinct Species.

As to the firſt, this outwardly appears to be regularly jointed from End to End, like a Lobſter's Horn, or rather the *Vertebræ* of Fiſhes; each Articulation is ſurrounded by ſhort capillary Branches; which, when magnified, have the Appearance of Sickles, and bend in towards the main Stem. Along the Inſide of theſe, are regularly placed minute Sockets which ſupport ſmall open Denticles of a Cup-ſhape; which are of ſo tender a Nature, that they are ſcarce viſible, but in recent Specimens: Between the minute hair-like Branches, we have obſerved, on ſome Specimens, ſmall egg-ſhaped Veſicles, fixed on Foot-ſtalks, with their Openings or Mouths, on the Side of the Top of each, looking towards the middle Stem; and, in moſt of them, ſome of the ſame kind of yellow Subſtance that we meet with in other Veſicles. The whole Stem, Branches, and Foot-ſtalks, to the Veſicles appear hollow, in ſuch Specimens as we find caſt on Shore; ſo that it appears as if the Water could paſs freely through them all without Interruption.

The Roots of both Species conſiſt, like the former, of a ſpongy Maſs of minute *Tubuli*, irregularly interwoven together; but, upon ſeparating this Maſs from the lower Part of the Stem, we found them regularly entering into it, in Whirls round the Joints, in the ſame Form that the Branches come out of the Joints of the Stem.

Fig.

Fig. *a*, repreſents the natural Size of the Coralline I have been deſcribing: But I muſt remark, that we often meet with Specimens three times as long as this.

Fig. *A*, is a Part of one of the Stems magnified to ſhew the Shape of the Veſicles, and the Diſpoſition of the Branches.

Fig. *B*, is the lower Part of one of the Stems, ſhewing the Manner that the little radical Tubes enter into it.

Mr. *Ray*'s ſecond Species, I take to be the ſame as the former, but in a younger State. This differs in being branched out, and in having its capillary Ramifications much longer.

While I was on the *Suſſex* Coaſt, I met with this Coralline adhering to an Oyſter-ſhell, and in the utmoſt Perfection, the Animal being alive in it.

An Account of this, with a very elegant Drawing, taken on the Spot by the ingenious Mr. *Ehret*, I had the Honour to lay before the Royal Society in *June* laſt.

Fig. b. N°. 14. is a Deſign taken from a dried Specimen of it. That which we viewed at the Sea-ſide in Salt-water had its little *Fibrillæ* along the Branches more extended, or ſtood out more, like minute Plumes of Feathers.

Fig. *C.* is the magnified Repreſentation of one of theſe *Fibrillæ*, or minute ſickle-ſhaped Branches, as it appeared with the Animals thruſting out their Claws from their Denticles. Though this little Branch appears to be jointed, yet the fleſhy Part of the Animal, which is here expreſſed by the dark Shade, is connected together through every joint, as well as to every little Polype.

This was magnified by the fourth Glaſs of *Wilſon*'s Microſcope; and the ſickle-ſhap'd Branches at *A*, by Glaſs N°. 6

Plate X

N°. 15. *Corallina erecta, tubuloſa, pennata, halecis ſpinæ facie.* Plate X.
Corallina ſcrupoſa, pennata, cauliculis craſſiuſculis rigidis.
R. S. N°. 15. p. 36.
Herring-bone Coralline.

This Coralline is often found ſticking to Oyſters as they are brought to the *London* Market, during the Winter-ſeaſon.

It grows to be 6 or 8 Inches high, erect and ſtiff, but very brittle when it is dry. The Stems conſiſt of a great Number of ſmall Tubes growing nearly Parallel to each other; in ſome, one may count, in a tranſverſe Section, above one hundred: Theſe ſeem to ariſe from a great Number of the ſame ſort of Tubes, irregularly matted together like a piece of Sponge; which are fixed to Oyſter-ſhells, and ſupport the Coralline like ſo many Roots.

This Coralline increaſes in Size, by Detachments of theſe tubulous Roots, which ariſe all round, and creep along the Outſide of thoſe that went before, to which they firmly adhere; and when they arrive at the Deſtination, that Nature has appointed them, they change their Appearance, and take the Shape of Branches, placed at a regular Angle of 45 Degrees from the Stem; and ſo exactly proportionable is the Diſtance of theſe Branches from one another, that though they are placed alternately, with reſpect to each other, yet the whole has, at firſt Sight, the Appearance of an Herring-bone; the Sockets on the Branches are placed alternately. On theſe Sockets, while I was at *Whitſtable* in *Auguſt* laſt, I perceived very tender tranſparent Denticles of a cylindrical Shape, which appeared to be double; that is, one above the other; in theſe were Polypes, which were connected by their lower Parts to a ſlender fleſhy Subſtance of the ſame Nature with themſelves, which I could trace through the Middle of the Branches, and Tubes of the Stem.

I received ſome Specimens of this Coralline, that were gathered in the Month of *April*: Their Side-branches were covered with regular Rows of Veſicles ſtanding upright; theſe were almoſt full of a yellow Subſtance, like many of the other Veſicles. When the Coralline is in this State, the Fiſhermen ſay they are in Bloſſom. The Shape of theſe Veſicles is an irregular Oval, with a Tube ariſing from the Pedicle, and paſſing up on one Side to a little above the Top of each: This Tube is open at Top, and ſeems cloſely united to the Veſicle.

We muſt here obſerve, that there is a good deal of Reſemblance, in Miniature, of this Coralline to ſome of the *American* Keratophytons, or Sea-feathers, that grow in a pennated Form, and are covered with a Cruſt of regular Rows of little Animals in their Cells, along the Edges of the Branches.

The Manner likewiſe of this Coralline's increaſing its Trunk and Branches in Bulk, by a continued Succeſſion of freſh *Tubuli* ariſing all round them, and adhering firmly to thoſe that aroſe before, gives us ſome Idea of the Formation of Corals, that are compoſed of Tubes, which, as the Animals retire, are filled with a ſtony Matter. For even in the Stems and Trunks of this Coralline, we may obſerve, that though the Materials, of which it is formed, ſeem to be of a ſpongy elaſtic Nature, yet the inner Tubes become firm, opaque, and brittle, whilſt the outward and more recent-formed Tubes are thin, tender, and tranſparent.

Fig. *a*, N°. 15. Plate X. gives us the Appearance that this Coralline makes in its natural State, with its ſpongy Tuft of Roots.

Fig. *A*, is a ſmall Sprig magnified, to ſhew the Tubes of which

Plate XI

which it conſiſts; with the Form of its Veſicles, and the Polypes in their Denticles.

Fig. *C*, ſhews on the ſame Sprig the alternate Order of the Sockets, in which the tender double Denticles, containing the Polypes, are fixed.

Fig. *B*, ſhews the *Tubuli* of Part of the Stem not ſo highly magnified.

N°. 16. *Corallina ſetacea, inſtar arundinis geniculata, capillamentis ſingulis unicuique geniculo alternatim diſpoſitis.* Plate XI.

An Fucoides ſetaceum tenuiſſime alatum? R. S. N°. 6. p. 38.

An Fucoides ſetis minimis indiviſis conſtans? R. S. N°. 7. p. 39.

Sea-Briſtles.

This ſmall Coralline grows on Muſcle-ſhells, and other marine Bodies, like ſtiff Briſtles. When they are found dry on the Shore, they all bend one way, like the ſmall ones deſcribed on the Muſcle-ſhell, N°. 16. Plate XI. which Repreſentation was taken from Nature.

Upon examining one of the Stems in the Microſcope, it appeared jointed, like a Reed, as at *A*. From the upper Part of each Joint ariſes a ſmall capillary Branch; theſe are diſpoſed, in reſpect to one another, in an alternate Order: They are alſo jointed; and upon the upper Part of theſe Joints are placed in Sockets, ſmall cup-ſhap'd Denticles, in which I diſcovered Polypes, like thoſe deſcribed in the Lobſter's-horn Coralline; and here repreſented at *A*, Plate XI. The Veſicles in dry Specimens appeared as in the ſame Figure *A*, ſhaped like an Olive. I obſerved one at *Bright-*

helmſtone with its Animal juſt contracted, as in the ſame Figure under the other Veſicles, the Top of which is indented, and appeared not unlike a Coronet: At *Whitſtable*, I lately collected a curious Specimen of this Coralline, which is repreſented on the Muſcle-ſhell, at Figure *a*, in its natural Size.

Plate XI. Fig. *a. A.* N°. 17. *Corallina confervoides gelatinoſa alba, geniculis craſſiuſculis pellucidis.* R. S. p. 34. N°. 7.
Silk Coralline.

This extreme fine, ſlender, and tranſparent Coralline, adheres, by many minute tubular Threads, like fine Silk, to Stones, and other ſubmarine Subſtances; theſe Threads uniteing form the Stem, from which proceed many long ſlender Ramifications, with a middle Stalk of a zigzag or alternately angled Form: From the Points of theſe Angles, go off very minute ſhort Branches, whoſe Diviſions are always two and two, that is, diſpoſed in a dichotomous Order. In theſe appear thro' the Microſcope regular Rows of Holes on one Side, each ſurrounded by a Rim like a Socket: Theſe Holes are placed proportionably nearer to each other, as the Branches grow leſs and leſs; which they do till they end in Points.

At N°. 17. *b*, Plate XI. is an exact Repreſentation of this Coralline in its proper Proportion: A ſmall Branch of this is magnified at *B*; and the fine tubular Threads, which are repreſented adhering to a Stone at Fig. *d*, are magnified at Figure *D*.

The Veſicles are of an oval Shape, and open at the Top; but they are ſo exceeding ſmall, thin, and tender, that they cannot be preſerved without the greateſt Difficulty.

In

Plate XII

In *September* 1753, I received ſome freſh Specimens of this Coralline in Salt-water, taken up at the *Nore*, near the Entrance of the *Thames*. In theſe I obſerved each of thoſe ſmall Holes ſupplied with a Veſicle, and a Polype in it, in the manner they are repreſented at Fig. *B*, Plate XI. Theſe Polypes have 8 *Tentaculi* or Arms; and while the Branch was in the Watch-glaſs of Sea-water, on the Stage of the Microſcope, I could plainly diſtinguiſh that the internal hollow Part of the whole Coralline was filled with the Subſtance of the Parent Polype, which appeared to be of a tender gelatinous Nature; and upon the leaſt Extenſion or Contraction of the young Polypes, this tender fleſhy Subſtance was viſibly affected; for each one was united to it by their lower Part or Tail.

Fig. *C*, was drawn from a Piece of a Branch not yet unfolded; the Ends of this are round, and the Polypes ſtill incloſed in their Veſicles, having not as yet arrived at Maturity. Theſe Embryo Polypes were ſmaller and cloſer as they approached towards the Extremities of the young Branch.

The Motion of the Inteſtines of the young Polypes was very diſtinguiſhable till the Water became putrid; and then both Veſicles and Polypes dropped off, like blighted Bloſſoms off a Tree; and the Subſtance of the Parent Polype, though ſeeming to fill the whole Cavity of the Branch before, as ſoon as the Water became improper for its Support, ſhrivelled up immediately ſo as ſcarce to be viſible.

N°. 18. *Corallina procumbens caule corneo, longo, filiformi, articulato, veſiculis, ramorum axillis, pedunculis contortis, inſidentibus.* Plate XII.

Sea-thread Coralline.

This Coralline has very tough, pliant, and thread-like,

Stalks divided into Joints by ſmall Rings; from theſe proceed little Footſtalks twiſted like a Screw, that ſupport Veſicles of an oval Shape; ſome with a ſmall Opening at the Top, and ſome quite open. This is found in great Abundance on the South-Weſt Coaſt of *England*, and ſeems moſt curiouſly contrived, from its Structure, to reſiſt the Violence of the Waves, all its Joints being furniſhed with Springs. Its Veſicles are alſo formed ſo as to yield eaſily to every violent Impulſe of the Water without Injury, from their being placed on Footſtalks formed like Screws.

Fig. *a*, N°. 18. in Plate XII. is the Appearance they make in their natural Size.

Fig. *A*, ſhews Part of a Branch magnified.

Plate XII. Fig. *b. B.* N°. 19. *Corallina minor repens caule nodoſo, articulato, & veſiculis alternis inſtructo.*

Knotted-thread Coralline.

This creeping Coralline is generally found adhering to the podded *Fucus*, from whence it throws out little jointed and waved tender Branches, about an Inch long: The upper Part of the Joints appear to be knobbed; upon theſe reſt the Veſicles in an alternate Order, ſupported by ſcrew-like Footſtalks. The Shape of the Veſicles is like an Oil-Jar with a Neck to it.

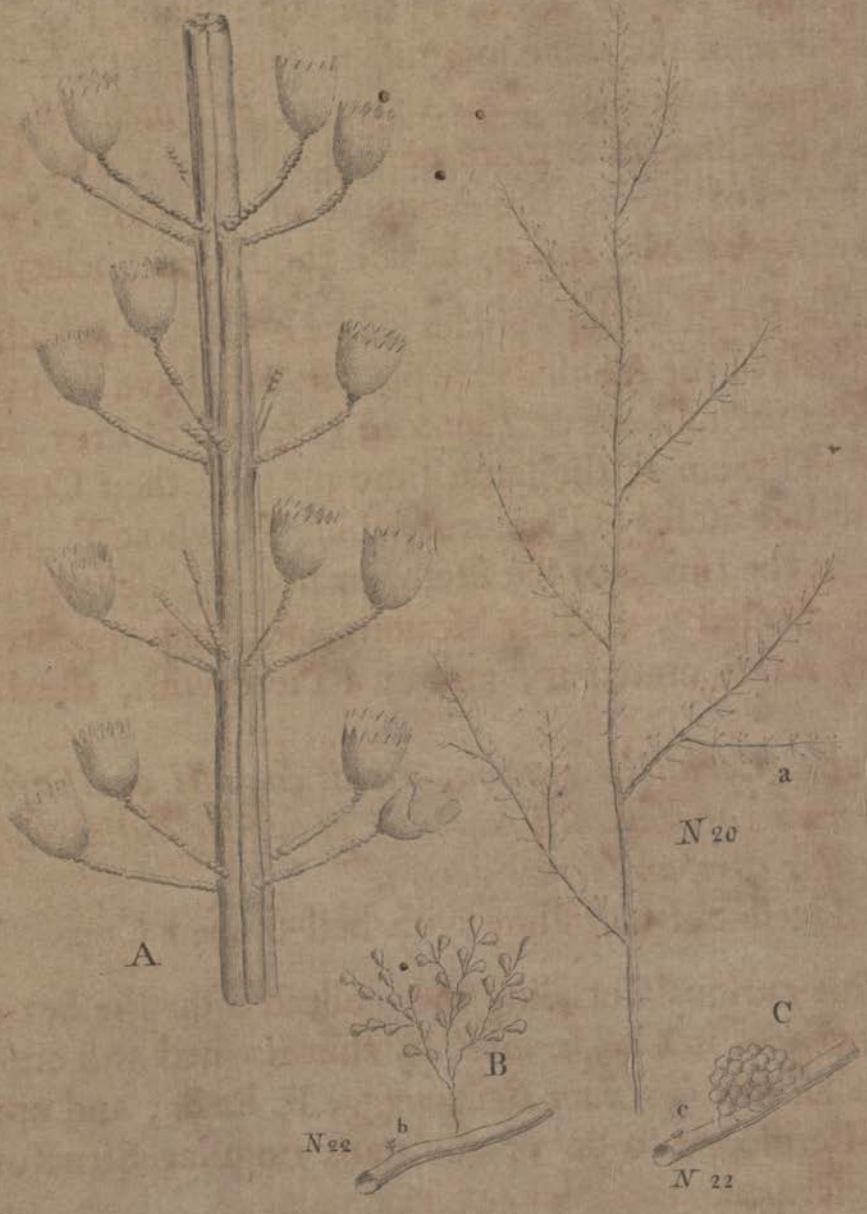
This Coralline was found at *Dover*; and I have lately received ſome Specimens from *Harwich*; ſo that I believe it is not uncommon on our Coaſts.

Fig. *b*, N°. 19. Plate XII. was drawn from a ſmall Piece of the podded *Fucus*, with ſeveral Branches of this Coralline growing upon it.

Fig. *B*, gives the Appearance of a ſmall Branch of it magnified.

In

Plate XIII



In *September* 1753, I received a recent Specimen of one of this Species in Sea-water, and had an Opportunity to diſcover in the Microſcope the Form and Motion of the Polype that poſſeſſed the Inſide of it, and of tracing the main Body through all its undulated Caſe, as it is expreſſed in the magnified Figure at *C.* In the ſame Plate, Fig. *c*, is the natural Size of the Piece magnified. Since this Obſervation, I had an Opportunity, in *June* 1754, at *Brighthelmſtone*, of ſeeing this Coralline in a more perfect manner; and have had the Honour of laying the Account of it, with a very curious Drawing by Mr. *Ehret*, before the Royal Society.

The Form of the Veſicles is like a Cup, in which the principle Parts of the Animals are placed: We have ſeen them thruſting out their Claws or *Tentaculi* in ſearch of Prey, and have obobſerved them at the ſame time moving their Cups with their ſcrew-like Stalks at Pleaſure; whilſt the whole Trunk of the Polype in the Inſide of the Stem, or horny Caſe, was at the ſame time affected with their Motions; for they appeared but as ſo many Arms united to, and of a Piece with, the Body.

N°. 20. *Corallina ramoſa, ramis ſingulis equiſitiformibus, in ſummis capillamentis contortis et verticillatim diſpoſitis, veſiculas campaniformes gerens.* Plate XIII. Fig. *a. A.*

Horſe-tail Coralline with bell-ſhaped Cups.

This curious Coralline was collected on the Sea-coaſt near *Whitehaven*, in *Cumberland*, by that learned and eminent Phyſician Doctor *William Brownrigg*, F. R. S.; and appears thro' the Microſcope to be of the moſt ſingular Structure of any yet deſcribed.

It conſiſts of ſundry Branches, and every Branch is compoſed of many ſtrait united ſmall Tubes, which, at certain equal Diſtances, ſend off ſmall capillary ſcrew-like Stalks, each

of

of which ſupport a Cup of a bell-ſhaped Figure, curiouſly indented round the Brim; theſe are placed in ſuch a manner as to correſpond exactly in Point of Situation with the others, and to give the whole very much the Appearance of the Plant called Horſe-tail, or *Equiſetum*; the capillary Stalks and their Cups being all diſpoſed in Whirls, or like Branches for Candles,

Fig. *a*, N°. 20. Plate XIII. gives us the Figure of this Coralline as it was received.

Fig. *A*, ſhews a magnified Part of one of the Branches diſcovering 5 Tubes, which compoſe the Stalk, and 5 twiſted Stalks with their Cups at equal Diſtances in each Whirl.

Plate XIV. Fig. *a. A.*

N°. 21. *Corallina minima ſcandens, veſiculas campaniformes in ſummo caule lineari contorto gerens.*

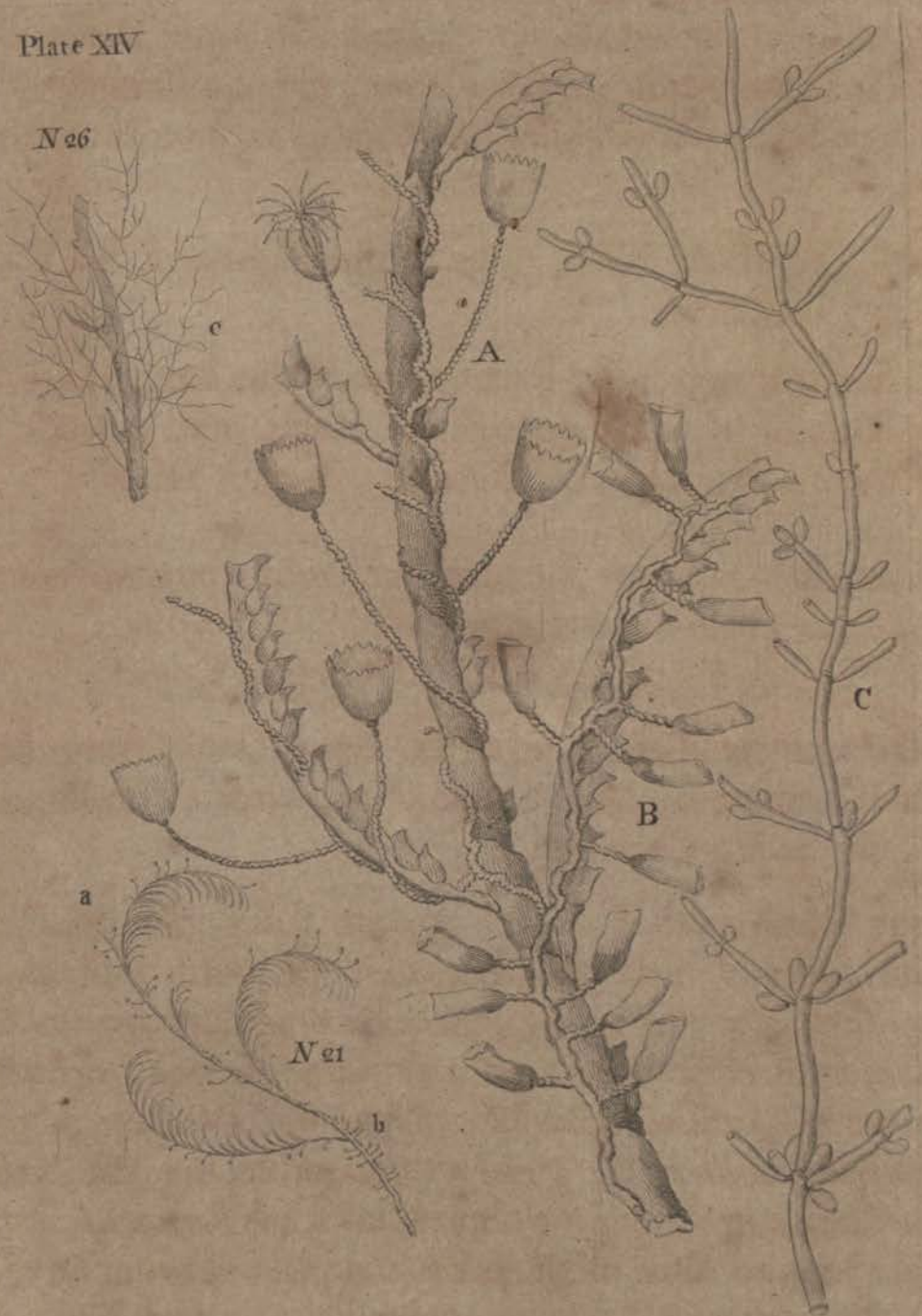
Small climbing Coralline with bell-ſhaped Cups.

This very minute Coralline ariſes from ſmall irregular Tubes, which adhere to, and twine about, other Corallines, particularly the Sickle Coralline.

Exceeding ſmall twiſted Stalks go out from this tubular Stem, which ſupport little bell-ſhaped Cups with indented Brims: At the Bottom of each, where they join to the Stalk, the Microſcope diſcovers to us a very minute Spherule, or little Ball, as in ſome Drinking-glaſſes. I had the Pleaſure while I was at *Brighthelmſtone* in *June* 1754, of ſeeing the Animals of this Coralline extending their Claws, or *Tentaculi*, and moving their Stems: One of theſe as it appeared to us in the Microſcope, is deſcribed at the upper Part of the Fig. *A*, Plate XIV. Their natural Size, as they adhere to the Sickle Coralline, may be ſeen at Fig. *a*, N°. 21.

This

Plate XIV



This Species of Animals ſeems to be nearly allied to the Bell-animals, adhering to the Duckweed, or *Lens Paluſtris*, deſcribed by Mr. *Lewenhoeck*, and of which he has given us a Figure in the *Philoſophical Tranſactions*, N°. 283, 295, and 337; only ours are much larger.

There is another Species of this creeping kind of Bell Coralline, which is found adhering to the Sea-fir Coralline.

The Difference between them is, that the twiſted Stalks of this are much ſhorter, and the Cups are longer ſhaped, and not indented about the Brims. See its natural Size Fig. *b*, N°. 21. in the ſame Plate; and Fig. *B*, its magnified Appearance.

N°. 22. *Corallina omnium minima, veſiculis nunc ramoſim, nunc racematim, denſe diſpoſitis.* Plate XIII. Fig. *b. B. c. C.*

Cluſtering Polype Coralline.

This is the ſmalleſt of all the Tribe of Corallines, appearing through the fourth Magnifier of *Wilſon*'s ſingle Microſcope, no bigger than the Fig. *B* and *C*. The natural Size is expreſſed at *b* 22. and *c* 22.

While I was obſerving with Attention ſome other marine Productions in the Microſcope, I diſcovered the round Bunch of tranſparent Globules, at Fig. *C*. ſticking to a Branch of one of the Corallines; this on a ſudden, to my great Surprize, roſe up, and expanded itſelf under my Eye, into the Plant-like Figure at *B*, with regular Branches and Stalks ſupporting Pear-ſhaped Veſicles: Each of theſe Veſicles, with its Polype in it, appeared to act independently for itſelf; for I obſerved each of them very buſy prowling about in Search of Prey, ſo far as the Length of their Stalk would permit them: In leſs than a Minute, I was as much amazed to find,

that, as if by common Conſent, upon ſome Warning given, the whole Company at once ſunk down, and contracted themſelves into the Figure of a Mulberry or Bunch of Grapes, like that at Fig. *C.* After it had continued for ſome Seconds in this Form, it again expanded itſelf as before, and in this manner continued expanding and contracting itſelf, during the whole Time of Obſervation.

This Species of Polype ſeems to agree with Mr. *Trembley*'s Cluſtering Polypes; only his were in freſh, and theſe in Sea, Water.

Plate XV. Fig. *a. A.* N°. 23. *Corallina exigua repens, denticulis alternis, fructûs medicæ cochleatæ æmulis.*

Snail-trefoil Coralline.

This very ſmall but curious Coralline was found creeping on the narrow-leafed Hornwrack of *Ray*'s *Synopſis*, called by him, *Fuci telam lineam ſericeamve textura ſua æmulantis altera ſpecies auguſtior.* R. S. pag. 43. N°. 10.

From the irregular creeping tubulous Roots, by which it adheres to the *Fucus* above-mentioned, ariſe little Spikes or Branches, furniſhed with alternate Denticles, moſt curiouſly furrowed, like the Seed-Veſſels of the Plant called the Snail-trefoil.

Fig. *a*, N°. 23. ſhews the natural Size of this Coralline, creeping on the Hornwrack.

Fig. *A*, repreſents the creeping Tubes with the Denticles, and one Veſicle magnified. While I was at *Brighthelmſtone*, *June* 1754, I diſcovered the Veſicles of this Coralline; for I had before apprehended the Denticles to be Veſicles; they differ but little from the Denticles, only in the 3 Teeth that are

Plate XV

are placed in the Opening at the Top of each. See the Veſicle above, Fig. *A.*

N°. 24. *Corallina exigua, caule geniculato, ſcandens, veſiculis ex unoquoque geniculo ſic diſpoſitis, ut ſyringam Panis referent.* Plate XV. Fig. *b. B.*

Fucoides Lendigerum capillamentis cuſcutæ inſtar implexis. R. S. pag. 30. N°. 3.

Nit Coralline.

This extremely ſmall climbing Coralline ariſes from very minute Tubes, by which it adheres to *Fucus*'s, and other marine Bodies; and is ſo diſpoſed from its jointed Shape, that it climbs up and runs over other Corallines and *Fucus*'s, as Dodder does over other Plants.

Fig. *b*, N°. 24. is the natural Size and Appearance of this Coralline.

The Veſicles, which have the Appearance of Rows of Denticles, are placed in ſuch a regular Order on the End of each Joint, that when they are magnified, they repreſent the antique Figure of *Pan*'s Pipe.

Fig. *B*, is the exact Drawing taken from the Microſcope.

I have called it the Nit Coralline from Mr. *Ray*'s calling it the Nit-bearing *Fucoides*. The ſmall Veſicles cloſely joined together, in little ſpeck-like Figures among the irregular capillary Branches, gives us ſome Idea of that Form. See the natural Size, Fig. *b.*

N°. 25. *Corallina minima repens, veſiculis ovatis, uvarum inſtar, ramulis adherentibus.* Plate XV. Fig. *c. C.*

Grape Coralline.

This exceeding ſmall Coralline creeps on the broad-leafed

Hornwrack of *Ray*'s *Synopſis*, pag. 42. N°. 9. called *Fucus telam lineam ſericeamve textura ſua æmulans*; and ſends out Cluſters of Veſicles from ſeveral Parts of its creeping Tube, each of which has a black Spot in it, like the Spawn of Frogs: Or rather, theſe look when they are magnified, like a Bunch of full ripe tranſparent oval-ſhaped Grapes with the Stones in them, as is repreſented in the magnified Fig. *C*, Plate XV. The natural Size of this Coralline is drawn creeping on the broad-leafed Hornwrack, at Fig. *c*, N°. 25.

Among many other marine Subſtances received freſh from the Sea, in *September* 1753, this Object happened to preſent itſelf under my magnifying Glaſſes; when, to my Surprize, I found thoſe grape-like Bodies were a Cluſter of Polypes, each having eight Claws or *Tentaculi*, very lively, extending themſelves about in purſuit of Prey; and upon their dying, the Animals contracted themſelves into their Veſicles, which cloſed at the Top: What we diſcover as a Spot, is only the Inteſtines of the Polype with its Food in it.

Fig. *D*, ſhews the Figure of the Polypes extending themſelves out of the Veſicles, as taken from the Microſcope: Theſe are placed on the ſame Branch, where the dead ones are repreſented like Grapes, at Fig. *C*.

Plate XIV. Fig. *c. C.* N°. 26. *Corallina cuſcutæ forma, minima, ramoſa, repens, ramulis oppoſitis, veſiculis minutiſſimis ovatis confertis, geniculis ramulorum inſidentibus.*

Climbing Dodder-like Coralline.

This very ſlender climbing Coralline has the Appearance of Dodder when it is magnified; and runs upon the podded *Fucus*, from whence it ſhoots into extreme fine ſlender

ſlender Branches, which are placed oppoſite to one another.

Fig. *c*, N°. 26. gives us the true Form of this Coralline climbing up the *Fucus*.

The Microſcope has diſcovered to us the Veſicles, which are ſmall and Egg-ſhaped, growing together, for the moſt part at the Joints of the Branches.

Fig. *C*, is a Branch magnified.

CHAP. III.

Of the Tubular Corallines.

BY Tubular Corallines are meant ſuch as are compoſed of a Number of ſimple Tubes, growing up near together; or ſuch branch'd ones as are compoſed only of Tubes without Denticles or Veſicles. Theſe are of the ſame horny, elaſtic Nature with the former; and like them recover their original Form, after being ſome time dry, by being put into Water: They ariſe too, like the preceding Claſs, from minute worm-like Tubes; and widen a little as they advance in Height. Some of them look wrinkled like the Windpipe, and others like the Inteſtines of ſmall Animals.

Plate XVI. Fig. *b*. N°. 1. *Corallina tubularia laryngæ ſimilis.*
An Fucus Dealenſis fiſtuloſus laryngæ ſimilis? R. S. p. 39.
Tubulous Coralline wrinkled like the Windpipe.

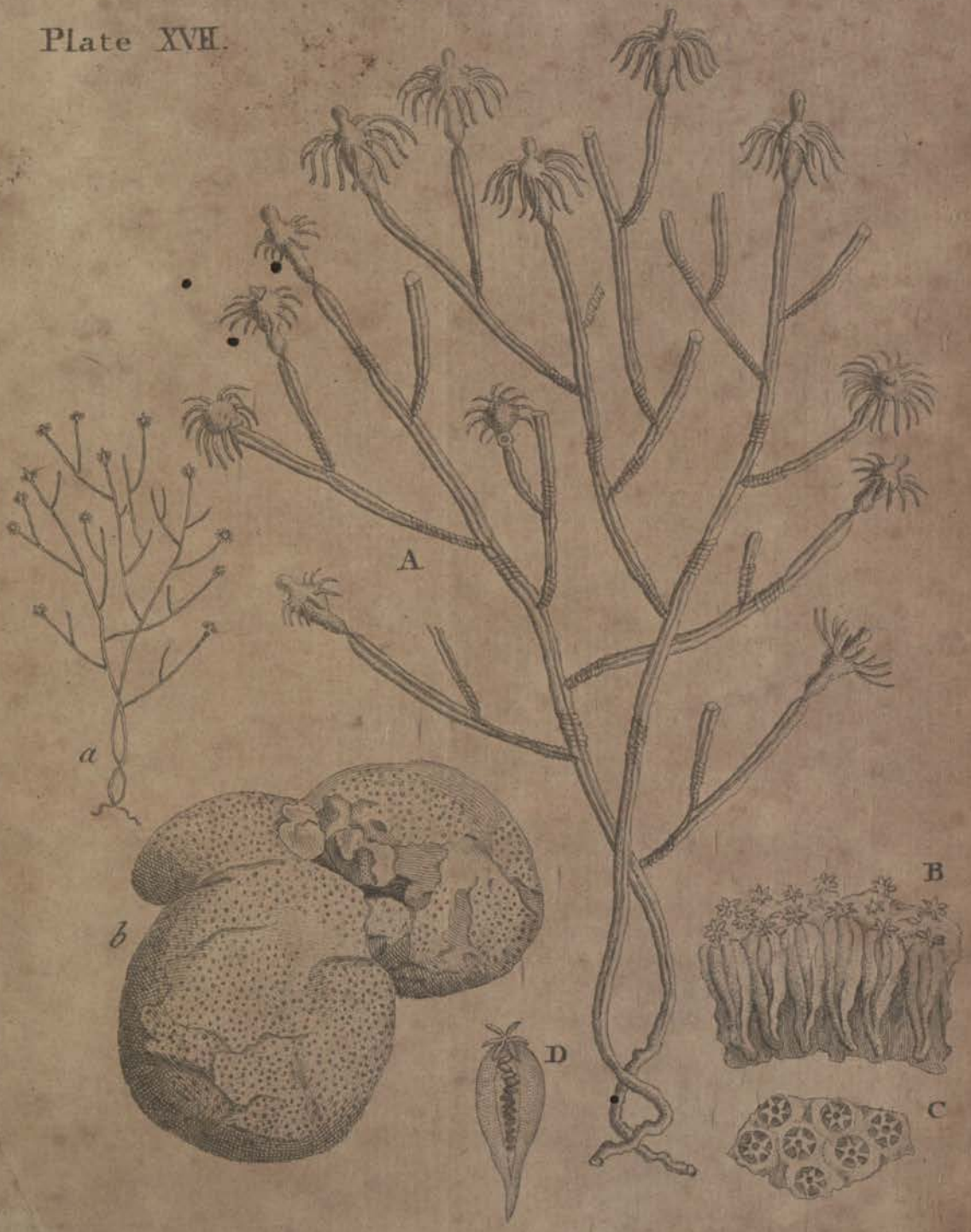
This Coralline is found in great Plenty in the Sea, near the Opening of the *Thames*, adhering to other marine Bodies, and often to the Bottoms of Ships. I have received it with the Animals alive in Sea-water; in which State it affords a moſt agreeable Scene: The Top of each Tube bearing a bright crimſon-coloured Polype, equal in Richneſs of Colour to the *Guernſey* Lily; all the Animals diſplaying their Claws or *Tentaculi* at the ſame time, with ſurprizing Agility.

Fig. *b*, gives the natural Size of ſome of theſe Tubes.

N°. 2.

Plate XVI.

Plate XVII.



N°. 2. *Corallina tubularia calamos avenaceos referens. Adianti aurei minimi facie planta marina.* R. S. p. 31. Plate XVI. Fig. *c.*

Tubular Coralline like oaten Pipes.

This is the largeſt of this Tribe of *Engliſh* tubulous Corallines; and is the ſame that the celebrated D. *Bernard Juſſieu* found on the Coaſt of *Normandy*, and deſcribed with its Polypes. It ariſes from ſmall worm-like Figures; many of which grow interwoven together, and look like the Guts of ſmall Animals: From this State they riſe into diſtinct Tubes of 5 and 6 Inches long, full of a thick reddiſh Liquor: On the Top of theſe the Polypes appear with plumed Creſts. Theſe Tubes in the dried Specimens have the Reſemblance of Oaten Pipes; that is, Part of an Oat-ſtraw, with the Joints cut off.

Fig. *C*, is the natural Appearance of this Coralline, with the Animals upon it.

N°. 3. *Corallina tubularia gracilis & ramoſa, axillis ramulorum contortis.* Plate XVI. XVII. Fig. *a.*

An fucus fiſtuloſus nudus ſetas erinaceas æmulans? R. S. pag. 39. Plate XVII. Fig. *A.*

Small ramified tubular Coralline.

This branched tubular Coralline is found frequently on Oyſters, and other marine Productions.

While I was at *Whitſtable* on the *Kentiſh* Shore, in *Auguſt* 1754, I found, among other Corallines, the Specimen deſcribed at Fig. *a*, Plate XXXV. with its Polypes alive: This I drew on the Spot from the Microſcope, with all its Animals extending themſelves in their different Directions, as they lay immerſed in a Glaſs of Sea-water; and are pretty exactly exhibited at Fig. *A*.

This

This Inſtance affords us a plain Demonſtration that the curious branched Corallines, deſcribed in the Beginning of this Eſſay, are of the Fabrick of Animals. From this, the moſt ſimple, we may trace them back through a Variety of Forms, up to the moſt perfect of the whole Tribe.

Here the curious Naturaliſt may plainly diſcover a Polype branching out like the common freſh Water one of Mr. *Trembley*'s, but ſtrongly fortified by Nature to ſupport itſelf in its turbulent Situation; for he will obſerve this is defended by a tough horny Covering, and fixed by its Baſe to ſolid Bodies in the Sea, to ſecure itſelf from the infinite Number of Enemies, that every Moment ſurround it: Whereas the freſh Water one, being confined to the calm and ſheltered Situation of Ponds and Ditches, does not ſtand in need of ſo neceſſary a Proviſion for its Defence.

Plate XVIII.

CHAP. IV.

Of Celliferous Corallines.

BY Celliferous Corallines, I mean thoſe ſmall plant-like marine Bodies, which adhere to Shells, *Fucus*'s, &c. of a brittle, cruſtaceous, and tranſparent Subſtance; and which appear, when magnified, to be fine thin Cells, the Habitations of ſmall Animals connected together, and diſpoſed in Variety of elegant Forms like Branches. All this kind effervesce with Acids.

N°. 1. *Corallina cellifera, erecta, ramoſiſſima, tenerrima, & plumoſa.* Plate XVIII. Fig. *a. A.*

Corallina pumila erecta ramoſior. R. S. p. 37. N°. 20. Soft-feathered Coralline.

The Appearance of this Coralline in its firſt or beginning State, is ſo unlike itſelf in the latter or more perfect State, that one would be apt, at firſt View, to take it for a different Species.

The lower Part of N. 1. Plate XVIII. at Fig. *a*, where it appears bare, without the feathered Branches, the Cells not being opened, is this firſt State. In this Condition we find it, in the *Hortus Siccus* of Mr. *Buddle*, in the Collection of the late Sir *Hans Sloane*, by the Name of, *Fucus minimus, hirſutus fibrillis herbaceis ſimilis.* D. Doody. R. S. 330.

But when it is in its perfect State, theſe tubulous Stalks riſe into beautiful plant-like Figures, with feathered Branches,

which are elegantly diſpoſed one above another, as in the upper Part of the ſame Figure, N°. 1. at *a*. When we examine it by the Microſcope, we find that each Branch is ſubdivided in a twofold or dichotomous manner; and each Diviſion of a Branch compoſed of two Rows of Cells of a ſemi-cylindrical Form, articulated together, and placed alternately Side by Side, their Faces or Openings looking one Way: Each Cell has a ſharp Point on the Top, ſtanding outward; and a black Spot in the Middle. Upon other Specimens I obſerved ſmall teſtaceous Figures on the upper Part of each Cell.

Fig. *A*, ſhews the magnified Appearance of the ſmall Tubes, paſſing into the unopened Cells which form the Stalk; from this ariſe the dichotomous Branches, with the Cells open, and black Spots in them. *B*, ſhews the teſtaceous Spherules on the Top of each Cell. At *C*, is a croſs Section of a Branch, to ſhew the hollow Inſide of the Cells. *D*, ſhews the upright Section of 3 Cells, with the Situation of the black Spots.

Theſe black Spots are nothing but the dead Polypes, or Remains of the Animals, once inhabiting theſe Cells. Of which I had evident Proof in my laſt Journey to the Sea-coaſt. For after I had examined this Coralline, with its Polypes alive in Sea-water (See *E*, Plate XVIII). I laid this Specimen aſide; and, upon examining it again ſome time after, I found the lifeleſs contracted Animals exhibited the Appearance above-mentioned.

Theſe Polypes turning into teſtaceous Bodies, opened a new Scene of Wonder to me. But the Minuteneſs of theſe ſhelly Figures would have been paſſed over, without any further Notice, if it had not been for a Preſent I received from

my

Plate XIX.

my worthy and ingenious Friend Mr. *Peter Collinſon*, F. R. S. of a Specimen of this Claſs of Corallines, which he had ſent him from *America*. Examining this carefully with the Microſcope, I plainly diſcovered it to be the connected *Vidus's*, or *Matrix's* of certain teſtaceous Animals, like ſmall Snails or *Neritæ*; an Account of which I have had the Honour to lay before the Royal Society, in *March* 1753. Plate XIX. Fig. *a. A.*

That theſe little Snails are perfect Animals, no-body will doubt, who has thoroughly examined them; and that the ultimate End of this curious branched Coralline, was made ſubſervient to the Purpoſe of introducing theſe little Creatures into Life: But ſuppoſe it is aſked, How do theſe go on to produce their Kind? This indeed will be difficult to anſwer, unleſs we may by Analogy ſuppoſe, that theſe minute Shell-fiſh grow large, and become capable of ſpawning the whole Coralline, in the ſame manner that the *Buccinum* of *New York* does its curious *Matrices* which are like long Bunches of Hops. See Plate XXXIII. Fig. *a*, *a* 1, and *b*.

Or, let us ſuppoſe, that the teſtaceous Animal, now in its utmoſt Perfection, lays its Eggs; theſe turn into vermicular-ſhaped Polypes, which, after they have fixed themſelves to ſome marine Subſtance, riſe up, and puſh forth into Branches of ſmall Polypes in their Cells, in a double Row, alternately placed in reſpect to one another; each having its proper Cell, which is divided from the other by very thin Partitions: And each little Polype is ſecured by an umbilical Ligament.

From this State then of being ſmall Polypes, we have obſerved, that they change into teſtaceous Animals, connected

to their Cells by the umbilical Ligament, till they are capable of providing for themſelves.

But whether this Ligament depends upon the Parent-Animal, as in the Caſe of the veſicular Coralline, Plate V. Fig. *A*, where the young Polypes are inſerted in a tender fleſhy Line, that paſſes through the Middle of the Branches, we have not been able to diſtinguiſh, for want of Opportunities of examining them often at the Sea-ſide.

Plate XX. Fig. *a. A.* N°. 2. *Corallina celliſera erecta, ramoſa & plumoſa, ſphærulas teſtaceas, ſumma parte aviumque capitum formas, a latere cellularum, gerens.*

Bird's-head Coralline.

This curious celliferous Coralline riſes from ſmall Tubes, which unite, and paſs into Branches of ſemi-cylindrical Cells diſpoſed in two Rows, articulated one into another: Their Openings face the ſame Way: On the Outſide of each Cell, we diſcover by the Microſcope, the Appearance of a Bird's Head, with a crooked Beak, opening very wide; the Uſe of which is as yet unknown to us, not having yet ſeen this Species recent in its proper Element.

The Balls, or little teſtaceous Figures, are much the ſame as in the former Species. This Coralline is of a glaſſy brittle Nature.

Fig. *a*, gives us the Appearance of this Coralline, as it is commonly found. The Specimen, from whence the Drawing was taken, was received, among other marine Productions, from the Sea-coaſt near *Dublin*.

Fig. *A*, ſhews a Branch with its *Tubuli*, Cells, and other Parts magnified.

N°. 3.

Plate XX.

N°. 3. *Corallina cellifera minor, repens, ramoſa, tubulis læ-vibus, interdum hamoſis ſparſim diſpoſitis, fucis teſtiſque alligata.* Plate XX. Fig. *b.* *B.*

Muſcus coralloides pumilus ramoſus. Dood. Appendix, R. S. 330.

Creeping Coralline.

This is the moſt common of all the celliferous Corallines, adhering to moſt kinds of ſubmarine Subſtances.

The Branches are dichotomous, or divide into two conſtantly as they extend: The Cells are like inverted Cones, and their Openings, which are round, look one Way, and are commonly found defended by little Spines: The Order of the Cells riſe in two Rows joined together, ſo as to be alternately oppoſite to each other. The Specimen magnified at Figure *B*, was found full of black Spots in the Cells, which, as hath been already mentioned, are nothing elſe but the dead Polypes. In other Specimens, we have obſerved little teſtaceous Balls at the Top of each Cell.

The Joints appearing in the Angles of the Ramifications, as in the magnified Figure, at *E*, are connected by ſome ſhort pliant *Tubuli*, which ſerve as ſo many Hinges to the Branches, to play to and fro freely, and comply with the violent Motion of the Sea. Theſe Hinges ſeem to conſiſt of two ſhort Tubes, one to each Row of Cells; and are ſo finely united to each Branch, that they ſeem inſenſibly to paſs into the Cells of each.

This Coralline differs from moſt others in the Situation of its tubular Roots, which appear as in creeping Plants, to proceed from different Parts of their trailing Ramifications.

Some of theſe little radical Tubes are diſcovered by the Microſcope, to be full of Hooks, the better to ſecure the Coralline, when it adheres to ſoft ſpongy Subſtances. The Hooks on one of the Tubes are expreſſed at Fig. *F*, in the Coralline, *B*. the natural Size of which is exhibited at Fig. *b*, N°. 3.

When this Coralline is put into Vinegar, a ſtrong Effervescence enſues, till the ſtony or coral-like Coat is deſtroyed; and then the Cells, ſtill keeping their Shape, appear to be made of a thin pliable Membrane, like thoſe of the Hinges and Roots: So that Roots, Hinges, and Cells appear now to be one continued tubulous Membrane, only modified into different Shapes.

Plate XX. Fig. *c*. *C*. N°. 4. *Corallina cellifera minor, repens, ramoſa, & ſcrupoſa, cellulis alternis a latere angulatis.*
Creeping ſtony Coralline.

This Coralline differs from the former in having angular Sides to its Cells, and in being of a more ſtony brittle Texture.

While I was at *Ramſgate*, in *Auguſt* 1754, I obſerved the Polypes in the Cells, as deſcribed at Fig. *C*; which is a magnified Branch of Fig. *c*, N°. 4. in the ſame Plate.

Plate XX. Fig. *d*. *D*. N°. 5. *Corallina cellifera minima, erecta, ramoſa, cellulis infundibuli-formibus, baſi conjunctis, oribus patentiſſimis, ſuperne ciliatis, & alternatim prominentibus.*
Ciliated Coralline.

This very ſmall Coralline ariſes from many *Tubuli*, which unite, and ſend forth Branches of Cells of a Funnel-ſhape, placed

Plate XXI

placed alternately, and closely united at the lower Part of the Sides: Their Entrances are very wide; and the upper Part of them, which projects, is full of small Hairs like Eyelashes. Their Bases are narrow, and seem to be jointed; and if we look attentively in the Microscope, we may discover a small white Hair, which seems to pass through the Middle of each Branch at the joining of the Cells. This Coralline bears testaceous Bodies on the Front of the Cells, somewhat resembling the upper Part of an Helmet; and at the Sides of some of the Cells, little Figures like Birds Heads, not unlike those of the second celliferous Coralline.

At Fig. *D*, we have the magnified Figure of this Coralline: And at *d*, N°. 5. the natural Size of it. Of all this Class of Corallines, this is one of the most delicate and tender.

N°. 6. *Corallina cellifera minima, fragilis, ramosa, & vesiculifera, colore eburneo cellulis tubiformibus conjunctis, paulum arcuatis, & fere oppositis.* Plate XXI. Fig. *a. A.*

Tufted Ivory Coralline.

This Coralline, carefully examined in the Microscope, appears to arise from minute compressed Globules, which have been deposited on a *Fucus*: In the Centre of each of these, we may observe a small Hole, from whence proceed very slender jointed Tubes, which pass into Branches consisting of double Rows of tubular Cells placed almost opposite, and united at the Sides; but the Tops standing out a little: From the Side of these Branches proceed here and there small hollow Vesicles, which are very brittle, and full of small Specks. Close to one Side of the Vesicles, we have observed a small Tube, which, no doubt, is the Entrance into them. This Species comes very near to the Class of vesicular Corallines; for in some Specimens of this Species at the Sea-side, we have lately

lately diſcovered dead Animals in the Veſicles: But on account of their brittle ſtony Nature, their having black Specks in their Cells, and their Branches being united by ſmall tubular Hinges, they are introduced here.

Fig. *a*, N°. 6. is the exact Repreſentation of this Coralline, growing to a Piece of a *Fucus*.

Fig. *A*, gives the magnified Appearance of a Branch of it, as it riſes from the *Fucus*.

Plate XXI. Fig. *b. B.* N°. 7. *Corallina cellifera mollis ramoſiſſima, geniculis ad loricæ formam accedentibus.*

Muſcus coralloides mollis, elatior, ramoſiſſimus. App. R. S. 330.

Corallina geniculata mollis, internodiis rotundis breviori-bus noſtras. Pluck. Mant. 56.

Coat of Mail Coralline.

This Coralline, which grows into larger Tufts and Bunches than the reſt, conſiſts of many long, ſhining, ſoft, and ſlippery Branches: Theſe are compoſed of Joints of Cells, placed in Pairs Back to Back. The Opening of each is on a Slant near the Top, and looks the contrary Way to the other: So that the Pair together reſembles a Coat of Mail, or Pair of Stays; and the Entrances of the Cells look like the Places for the Arms to come out at. The Joints, or Pairs of Cells, ariſe inſenſibly from *Tubuli*, by which the Coralline adheres to its Baſe; and at certain Seaſons of the Year, we may obſerve ſmall black Spots in the Cells, like ſome of the reſt of this Claſs.

This Coralline is found in plenty along the Sea-coaſt of the Iſland of *Sheppey*; and is frequently found creeping upon, and inveſting the ſilk Coralline before deſcribed.

Fig.

Plate XXII

Fig. *b*, N°. 7. repreſents the natural Appearance of this Coralline: This Specimen is but a ſmall Part of the Coralline, as it is commonly found.

Fig. *B*, is a Drawing from the Microſcope of a ſmall Branch, as it riſes from the *Tubuli*.

N°. 8. *Corallina cellifera minima, ramoſa, cellulis compreſſis, oppoſitis, ſiliculæ burſæ paſtoris formam æmulans.* Plate XXII. Fig. *A. a.*

Shepherd's-purſe Coralline.

This moſt beautiful Pearl-coloured Coralline adheres by ſmall Tubes to *Fucus's*, from whence it changes into flat Cells; each ſingle Cell like the Bracket of a Shelf, broad at Top, and narrow at Bottom: Theſe are placed Back to Back in Pairs, one above another, on an extremely ſlender Tube, that ſeems to run through the Middle of the Branches of the whole Coralline.

The Cells are open at Top. Some of them have black Spots in them: And from the Top of many of them, a Figure ſeems to iſſue out like a ſhort Tobacco-pipe; the ſmall End of which ſeems to be inſerted in the Tube that paſſes through the Middle of the whole.

The Cells in Pairs are thought by ſome to have the Appearance of the ſmall Pods of the Shepherd's Purſe: By others, the Shape of the Seed-Veſſels of the Herb *Veronica*, or Speedwell.

Fig. *a*, N°. 8. repreſents ſome Branches in their natural Size, creeping on the Stock of a *Fucus*.

Fig. *A*, repreſents a Branch with its ſmall Tubes, magnified by Number 5 of *Wilſon*'s ſingle Microſcope.

Plate XXII. Fig. *b. B.* N°. 9. *Corallina cellifera minutiſſima, ramoſa, & falcata, cellulis ſimplicibus, tauri cornu facie invicem inſertis.*

Bull's-horn Coralline.

This beautiful Coralline is one of the ſmalleſt we meet with: It riſes from *Tubuli*, growing upon *Fucus's*; and paſſes from thence into ſickle-ſhaped Branches, conſiſting of ſingle Rows of Cells looking, when magnified, like Bull's Horns inverted: Each one ariſing out of the Top of the other. The upper Branches take their Riſe from the Fore-part of the Entrance of a Cell, where we may obſerve a ſtiff ſhort Hair, which ſeem to be the Beginning of a Branch.

The Opening of each Cell, which is in the Front of its upper Part, is ſurrounded by a thin circular Rim; and the Subſtance of the Cells appears to conſiſt of a fine tranſparent Shell, or Coral-like Subſtance.

Fig. *b*, N°. 9. is the natural Size of this minute Coralline adhering to a *Fucus*.

Fig. *B*, ſhews the Tubes, and the falcated Ramifications of the Cells, as magnified by the fifth Glaſs of *Wilſon*'s Microſcope.

Plate XXI. Fig. *c. C.* N°. 10. *Corallina cellifera, minutiſſima, falcata, & cruſtata, cellulis capricorniformibus ſimplicibus, veſiculas gerens.*

Goat's-horn Coralline.

This very ſmall capillary Coralline conſiſts of Branches of ſingle Cells, ſhaped like Goat's Horns inverted, placed one

one above another: On the Top of each is a ſmall circular Opening which inclines inward: At the Back of this ariſes a fine upright Hair near the Inſertion of the next Cell above it.

This Coralline bears oval-ſhaped Veſicles, which are ſpecked, or pointed like the celliferous Coralline, N°. 6. with a ſmall Tube at the Back.

Fig. *c*, N°. 10. Plate XXI. gives us the true Figure of this Coralline adhering to a *Fucus*.

Fig. *C*, expreſſes an intire Piece, with its Veſicles and jointed Tubes magnified by the fifth Glaſs of *Wilſon*'s Microſcope.

This Coralline is nearly allied to the Sixth Coralline of this Claſs, on account of its Veſicles, only the Cells of this are ſingle with ſmall Hairs riſing out of them; and the Cells of that are diſpoſed in Pairs.

N°. 11. *Corallina anguiformis minutiſſima, non ramoſa.* Snake Coralline. Plate XXII. Fig. *c. C*

This ſingularly ſhaped Coralline proceeds from an irregular Tube, which is found creeping on the *Fucoides purpureum eleganter plumoſum*. R. S. pag. 38.

From very ſmall Holes in the broadeſt Part of this irregular winding Tube, there ariſe here and there ſmall teſtaceous white hollow Figures, exactly reſembling a Snake without the lower Jaw, in the Place whereof, is the Entrance into the Cell.

Fig. *c*, N°. 11. is the natural Size of this minute Coralline ſurrounding the Stalk of the *Fucus*.

Fig. *C*, expreſſes it magnified by the fourth Glaſs of *Wilſon*'s Microſcope.

The Body of this Snake-like Cell, when magnified by the ſecond Magnifier of *Wilſon*'s Microſcope, as at Figure *D*, appears to be jointed in the Middle, and to conſiſt of parallel Rings.

CHAP. V.

Of the Articulated Corallines.

AS the Corallines hitherto deſcribed took their Riſe from hollow, flexible, and horny Tubes, either ſingle, or many together; and proceeding uniformly to their Terminations in Branches, conſiſting either of ſimple Tubes, or of ſuch as are furniſhed with Denticles, or Veſicles, or both, or of connected Rows of Cells; ſo theſe, which we call articulated Corallines, are obviouſly different in their external Appearance, and in their Structure; though the Uſe of all the Kinds appear manifeſtly to be the ſame; *viz.* the Places of Abode of different Species of Polypes.

This Kind then, carefully examined by the Microſcope, appears to conſiſt of ſhort Pieces of a ſtony or cretaceous brittle Matter, whoſe Surface is covered with Pores, or Cells. Theſe ſtony Pieces, or Joints, are united to one another by a tough, membranous, flexible Subſtance, made up of many ſmall Tubes of the like Nature, compacted together.

When theſe are put into Vinegar, the ſtony or cretaceous Part is ſoon diſſolved, and leaves the other Part intire, which not only forms the ligamentous pliant Articulations; but is likewiſe the *Subſtratum*, and even forms the Cells, of the ſtony Joints themſelves.

Among the firſt of theſe I ſhall place;

Plate XXIII. Fig. *a. A.* N°. 1. *Corallina articulata dichotoma, internodiis ſubcylindricis, cellulis rhomboideis, omnino tectis, & tubulis membranaceis exiguis, colligatis.*

Corallina fiſtuloſa fragilis craſſior. J. B. 3. 811. R. Hiſt. 65.

Muſcus coralloides polygonoides ſalicorniæ folio major. Bar. Ic. 1275. N°. 7.

Corallina fiſtuloſa fragilis, internodiis prelongis lævibus, albis, farciminum modo catenatis. Pluck. Phytog. Pl. XXVI. Fig. 2.

Bugle Coralline.

There is a ſmaller Species of the ſame, which differs only in the Diameter of the Branches; and is known by the botanic Writers by the following Names, *viz.*

Corallina fiſtuloſa, fragilis ſubtilior. J. B. 3. 811. R. Hiſt. 66.

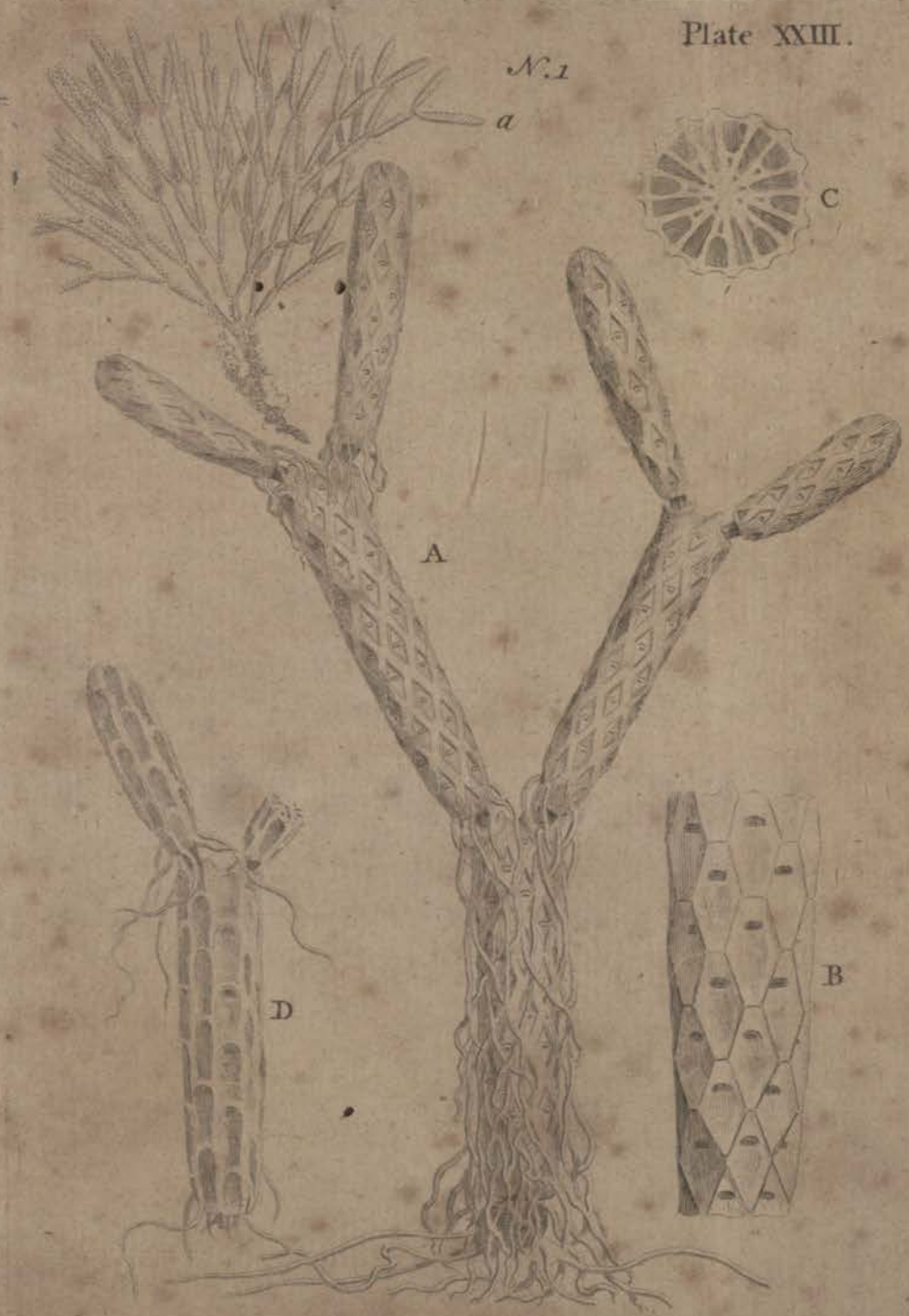
Muſcus polygonoides ſalicorniæ folio minor, ſeu bifidus. Bar. Icon. 1275. N°. 8.

This beautiful ſtony Coralline proceeds from tranſparent membranaceous Tubes, which enter into, and form, cylindrical Joints, compoſed of ſtony Lozenge-ſhaped Cells, with a proper Entrance into each: Theſe ſurround the whole Surface of the Coralline.

Fig. *a*, N°. 1. ſhews the natural Size of the larger Bugle Coralline.

Fig. *A*, is a Branch of it magnified, to ſhew the Appearance of the Tubes, Joints, and Cells. *B*, is a Piece of one of the Joints, that had been expoſed to the Weather, higher magnified, where the Form of the Entrance into the Cells may be

Plate XXIII.



be plainly ſeen. *C*, is a croſs Section of this Piece, to ſhew the internal Figure and Diſpoſition of the Cells.

The Joints of the Coralline riſe in a dichotomous Order; that is, by a conſtant progreſſive Diviſion into two Parts, and are connected together by ſhort *Tubuli* of the ſame Kind with thoſe they took their Riſe from.

Theſe Tubes in the Water are exeeding pliable, which make them move ſo freely, without breaking in the violent Agitations of the Sea.

The Shape of the Cells is not always of a Lozenge Figure: Sometimes we find them arched at Top, as at *D*; and ſometimes of the Shape of a Coffin, as ſome of the upper Cells at *B*.

When this Coralline has lain expoſed for ſome time on the Shore, it grows very hard, and white; and the Partitions between the Cells become thinner and more diſtinct, as at Fig. *B*.

Though the following Corallines differ in their Size, and Form of their Cells, and ſome other Particulars, as their tubulous Roots; yet as they anſwer the general Definition of this Claſs, and ſeem to follow in the Order of Nature, I have connected them together: That we may perceive the Pores, or Cells of this Claſs the more diſtinctly, it is neceſſary they ſhould be viewed immediately on their being taken out of the Sea; for as they dry, the cretaceous or coralline Matter ſhrinks, and unites the pore-like Cells on the Surface, ſcarcely to be diſtinguiſhed from a poliſhed Superficies, without the Help of the very beſt Glaſſes.

Plate XXIV. Fig. *a. A.* N°. 2. *Corallina Anglica.* R. S. p. 33. N°. 1. *Corallina alba officinarum.* Park. 1298. Coralline of the Shops.

This Coralline is fixed to Rocks and Shells by ſtony Joints, which, as they riſe, are united to others by extremely fine and ſlender Tubes: Theſe may be diſcovered by a good Eye, or a common Magnifier. As the Stems extend themſelves, they become pennated by Side-branches, which come out oppoſite to each other, and are joinſed in the ſame manner; the Joints of this Species are like the upper Part of an inverted Cone, but a little compreſſed: The whole Surface is covered over with very minute circular-ſhaped Cells like Pores (See Fig. *B*, and Fig. *B* 1) where they are higher magnified.

Fig. *B* 2, ſhews the croſs Section highly magnified.

Fig. *a*, N°. 2. is an exact Repreſentation of this Coralline as it was found growing to a Rock.

If a Branch of this Coralline is put into Vinegar, theſe Cells are diſſolved with the whole cretaceous Surface, inſtead of which there appear Rows of minute Ramifications, which ſeem to have communicated with each of theſe Cells (See Fig. *A.*)

Upon ſome Specimens of this Coralline, we may obſerve little ſmall Figures like Seed-veſſels, with which the Branches frequently terminate: They are alſo found on the Sides, as may be ſeen at Fig. *A*, where they are magnified.

This Branch was ſteeped in Vinegar, w[illegible]dered the whole ſoft, and from the little Knobs at th[illegible]nd Sides, were

Plate XXIV.

N.1.
N.2.
N.3.
N.4.
N.5.
N.6.
N.7.
N.8.
N.9.
a
b
c
d
e
f
g
h
A
A1
A2
B
B1
B2
C
D
E
F
G
H
H1
James Kirk Sc.

were ſqueezed out little twiſted Figures, like thoſe at *A* 1, which are magnified higher at *A* 2.

We frequently find this Coralline of different Colours, as red, green, aſh-coloured, and white; but all of it, by being long expoſed to the Sun and Air on the Shore, becomes white.

N°. 3. *Corallina Anglica procumbens, ſegmentis brevibus.* Slender trailing *Engliſh* Coralline. Plate XXIV. Fig. N°. 3.

This Coralline ſeems to be a Variety of the former, which grows ſtiff and erect, with large Joints; whereas this hangs down, having very ſlender Branches with ſmall Joints (See N°. 3. in Plate XXIV). The Colour of this ſeems to vary according to the Situation.

N°. 4. *Corallina Anglica erecta, ramulis denſe pennatis, lanceolæ formâ terminantibus, ſegmentis ad utrumque latus paululum compreſſis.* Plate XXIV. Fig. c. C.

Corallina ſquamata. Parkin. 1296.

Upright *Engliſh* Coralline, with Spear-like Heads and flat Joints.

This Coralline I received from the Reverend Mr. *William Borlaſe*, of *Ludgvan* in *Cornwall*, F. R. S. a very curious and ingenious Gentleman: To whom I am much obliged for many other Sea-productions.

It is moſt frequently found of a light-green Colour; and, poſſibly, the Copper Mines, which abound on many Parts of the *Corniſh* Shore, may affect the Colour; as the ochry Earth near *Harwich* does ſome of the ſecond Species with an Orange Colour.

N°. 4. Plate XXIV. repreſents this Coralline in its natural Form.

Fig. *C*, is a Branch of it magnified, to ſhew the Figure of the Joints. This has had its cretaceous Parts diſſolved by the Vinegar. Upon each Joint may be diſcovered the different Series of Ramifications, which lead to the Cells on the Surface: This will be more fully exemplified in ſome ſimilar foreign Sea-productions hereafter.

Plate XXIV. Fig. *e. E.* N°. 5. *Corallina ramulis dichotomis, teneris, capillaribus, & rubentibus.*

Corallina rubens, ſive muſcus marinus rubens. Park. 1296.

Reddiſh Hair-like Coralline.

This Coralline, when magnified, appears to grow in Branches always dividing into two Parts, conſiſting of long cylindrical Joints connected by very ſmall *Tubuli*; when the ſtony Part is diſſolved in Vinegar, the ſmall fibrous Ramifications, that correſpond with the minute Pores on the Surface, like the foregoing one, are eaſily to be ſeen.

N°. 5. Fig. *e*, is the natural Size. And

Fig. *E*, the magnified Appearance of a Branch of this Coralline.

Plate XXIV. Fig. *d. D.* N°. 6. *Corallina alba exigua, ramulis dichotomis ſegmentis corniculatis, fucis minimis teretibus adnaſcens.*

White ſlender jointed Coralline.

This Coralline differs from the foregoing, in having ſtronger and thicker Branches, and the Tops of the lower Joints diverſified with two projecting Points like Horns.

Fig. *d*, N°. 6. expreſſes a Tuft of this Coralline growing on a *Fucus*.

Fig.

Fig. *D*, ſhews the manner of its growing, and the corniculated lower Joints.

N°. 7. *Corallina dichotoma, capillis denſis, criſtatis, ſpermophoris, fucis minimis teretibus adnaſcens.* Plate XXIV. Fig. *f F.*

Corallina criſtata minima. Barrell. pag. 1328.

Muſcus coralloides criſtatus. Bar. Icon. 1296. N. 2.

Creſted or Cock's-comb Coralline.

The Branches of this Coralline likewiſe go off in Pairs, or in a dichotomous Order; it grows in round Tufts, like the Creſt or Topping on a Bird's Head. A Number of theſe Branches being ſpread out like a Fan, and placed flat on one another, compoſe theſe agreeable Creſt-like Figures; ſome of them are of a fine red, others green, with a white Edgeing. They are generally found growing on a round ſlender *Fucus*. On the upper Part of the Branches the Microſcope diſcovers ſome ſmall Veſicles; from the Top of each of theſe ariſes the Beginning of two other Branches, ſo that they ſeem to be of Uſe in buoying up the Coralline.

Fig. *f*, N°. 7. is the natural Appearance of this Coralline.

Fig. *F*, is a magnified Branch with the Veſicles.

N°. 8. *Corallina alba ſpermophoros, capillis tenuiſſimis.* Plate XXIV. Fig. *g. G.*

Corallina muſcoſa, ſeu Muſcus marinus tenui capillo ſpermophoros. Mor. Hiſt. Ox. Part III. p. 651. S. 15. T. IX. f. 9.

Seed-bearing Coralline.

This exceeding ſlender white Coralline appears under the Microſcope to bear little Veſicles, in the Form of Seed-veſſels, which ſeem to buoy it up in the Water; out of each of theſe ariſe two fine ſlender Hairs, and from each of which riſe

other Veſicles; from theſe proceed two fine pointed Hairs, which finiſhes this beautiful minute Coralline. There ſeems to be a great Affinity between this and the creſted Coralline; tho', from the whole of its Appearance, there ſeems juſt Reaſon to make it a diſtinct Species.

The Veſicles, on the ſtricteſt Examination, appear to have no Opening into them.

N°. 8. Fig. *g*, is the natural Appearance, but in general the Tufts are fuller.

Fig. *G*, is a ſmall Sprig, with the double Row of Veſicles magnified.

Plate XXIV. Fig. *b. H.* N°. 9. *Corallina plumoſa nivea, fuco minimo, tereti adnaſcens.* Snow-white downy Coralline.

Among ſome uncommon Corallines, which I received from my worthy Friend the Reverend Mr. *Borlaſe*, near *Penzance* in *Cornwall*, I met with this moſt curious minute one, adhering to a *Fucus*. At firſt I took it for ſome white Down of Feathers; but, upon Examination, I found it to be an articulated Coralline, with the Joints united by *Tubuli*, as perfect as in the larger Kinds.

Fig. *b*, N°. 9. Plate XXIV. is the natural Size of it, adhering to a Piece of a *Fucus*.

Fig. *H*, is the magnified Appearance of ſeveral Pieces of the Coralline, faſtened by ſmall Globules to the Fibres of the *Fucus*, likewiſe magnified. From theſe Globules riſe 3 or 4 cylindrical Joints.

Fig. *H* 1, expreſſes the Globule and Joints magnified higher. The whole Surface appears here to be covered over with hollow Squares.

Obſer-

Plate XXV.

Obſervations on ſome of the articulated Corallines of Jamaica:

Theſe are introduced here, to ſhew the Operations of Nature in the warmer Climates; and to ſet before us in a clearer Light, the curious Conſtruction of the Corallines of our own. Our articulated Corallines, as was obſerved before, are ſo denſe, except the firſt, and their Surfaces ſo ſmooth, that the Microſcope can but juſt diſcover to us their Pores. The *Weſt-Indian* Corallines are generally of a looſer Texture: The naked Eye can eaſily diſcern the Pore-like Cells all over the Surface; and at the ſame time very plainly diſtinguiſh the Tubes that connect the Joints. Plate XXV. Fig. *a. b. c.*

When the cretaceous Matter is diſſolved in Vinegar, we may obſerve, with the Microſcope, the Hinge-like Tubes continued in Ramifications, that expand themſelves over the flat Superficies of each Joint, and end in little Cups, that are united at the Sides, ſo as to form a Surface like an Honeycomb: Each minute Cup has a ſmall Hole at the Bottom, by which it communicates with a particular little Tube of one of the leſſer Branches; and the Top of each Cup correſponds with a Pore on the cretaceous Surface.

Fig. *a* and *b*, Plate XXV. ſhew two Species of theſe Corallines in their natural Size.

Fig. *A*, ſhews the Pores of one of the Joints of Fig. *a* magnified.

Fig. *A* 1, ſhews the regular Ramifications ending in flat Surfaces of little connected Cups, joined together like an Honeycomb, after the cretaceous Matter of the Joint, at Fig. *A*, was taken off by the Vinegar.

Fig.

Fig. *B*, and *B* 1, ſhew the Joint and ramified Tubes of the leſſer Species at Fig. *b*, magnified when the cretaceous Surface was taken off in like manner.

I ſhall introduce a third Species of articulated Coralline, on account of its Singularity; it ſeems to be the *Corallina fiſtuloſa Jamaicenſis candida cum internodiis breviſſimis, & quaſi filo trajectis*, of *Plukenet.* I ſhall call it the Roſary or Bead-Coralline of *Jamaica* (See Fig. *c*, Plate XXV).

The Fig. *C*, ſhews one of the Beads magnified; and on the lower Part, where the next Bead is laid open to diſcover the Tube, we may perceive regular Rows of ſmall Pipes, that lead from the middle horny Tube, through the cretaceous Subſtance to the Cells on the Surface, at *g*.

The Tuft of Hair-like Tubes, at *C*, which are to be ſeen at the Top of each Branch, appear to be the Ramifications, that belong to the next Bead that is to be formed.

When the cretaceous Part is diſſolved in Vinegar, we find many Seed-like Particles diſpoſed among Cells of an Heart-ſhape, as at Fig. *C* 1.

To theſe I ſhall add another Sea-production, upon account of its approaching to the articulated Corallines, in its manner of growing.

I received it, among many other Varieties, from the Sea-coaſt of the *Iſle of Wight.* It appears in the Microſcope to be tubular, and different from any thing I have yet met with from our Coaſts. I have called it,

Plate XXVII. Fig. *b. B.* *Corallina tubulata tenera, dichotoma, & puſtuloſa.*
Dichotomous tubular Coralline.

This appears, through the Microſcope, full of Warts and Puſtules,

Plate XXVI.

J. Myndé fc.

Puſtules, with a ſmall Speck in the Middle of each. It ſeems to be of an horny tranſparent Nature. Each Pair of Joints or Branches are inſerted in the Top of the next Joint or Branch below them, as in ſome of the ſmaller articulated Corallines juſt now deſcribed.

Fig. *b*, is the natural Size of a ſmall Part of this Coralline.

Fig. *B*, is a ſmall Piece of it magnified.

CHAP. V.

Of the Keratophyta.

NEXT in Order to the Corallines, may be ranked the *Frutices coralloides*, or Sea-ſhrubs; now more generally known among Naturaliſts by the different Appellations of *Lithophyta*, *Lithoxyla*, or *Keratophyta*; Epithets intended to convey an Idea of their Compoſition, which, at firſt View, ſeems to conſiſt partly of a woody or horny, partly of a ſtony or calcareous, Subſtance, variouſly diſpoſed with reſpect to each other.

The general Form of theſe Bodies approaches to that of Shrubs, having a Root-like Baſe, by which they adhere to ſome ſolid Support in the Ocean; and a Stem or Trunk, and Branches differently diſpoſed; ſome riſing up in one or more diſtinct Twigs, and theſe ſubdivided into ſmaller and ſeparate Ramifications; while others have their ſmaller Branches connected in ſuch a manner, as to form a curious Net-like Structure: From this Diverſity of Figure, and external Appearance, they commonly borrow the Names, by which they are known in the Cabinets of the Curious, as Sea-Fans, Feathers, and the like.

But as it is not my Deſign to write an expreſs Treatiſe on this Subject, I ſhall only obſerve, That moſt of theſe *Keratophyta* when perfect, if their Structure is carefully examined, exhibit the following Appearances:

Firſt, A woody kind of Baſe or Root, which either ſtill adheres, or ſhews that it has adhered, to ſome ſolid Body, as Rocks, Corals, large Shells, or the like.

View this Baſe attentively, and it appears to conſiſt of longitudinal Fibres lying cloſe Side by Side, and connected inſeparably without Violence, running from the Circumference of the Baſe to the riſing Trunk, along which they are diſpoſed in like manner; and the ſame Texture may by good Glaſſes be traced to the Extremities of the Branches. Theſe Glaſſes diſcover, that what to the naked Eye ſeemed to be Fibres, are indeed ſmall Tubes, of which the whole Shrub conſiſts, but compreſſed, and ſhrunk in.

If we cut the Trunk, or any large Branch of theſe *Keratophyta* tranſverſely, and examine their Structure nicely, we may plainly diſcover, not only the Courſe of theſe longitudinal Tubes, but, likewiſe, that they are circularly diſpoſed about the Centre of the Trunk, ſomewhat in the ſame manner as appears in the annual Circles of Wood, with this Difference however, that in the *Keratophyta* the Circles do not adhere ſo cloſely to each other as in Wood; but appear plainly to be ſuperinduced, and often with ſome heterogeneous Matter intervening.

The Part we have hitherto deſcribed, is that which ſome Naturaliſts have called the woody Part of the *Keratophyta*; others, from its affording when burnt a ſtrong Smell like burning Horn, the horny.

And this, in all the various Species of this kind of Bodies, however different in Size, Figure, and external Appearance they may be, appears almoſt uniformly to be the ſame, exhibiting to the View a ſimilar Structure, and the ſame Principles, when chemically analyſed.

Upon this horny or woody Part is ſuperinduced a kind of ſtony or calcarious Coat, covering both Trunk and Branches to their very Extremities.

The calcarious Coat commences thin where the Trunk begins, grows thicker as the Branches advance; and the youngeſt Fibres have, generally, by much the largeſt Proportion, if not the largeſt Quantity ſurrounding them: This Part likewiſe, when thrown into the Fire, yields ſomething of a marine horny Smell. If we examine this Coat attentively, even with the naked Eye, we may diſcover in many kinds, regular Orders of Pores or Cells; and, viewed by the Microſcope, it conſtantly appears to be an organical Body, and not the accidental Concretion of adventitious Subſtances, like the indurated Cruſt upon Moſs and other Vegetables in petrifying Waters, but a regular Congeries, like the Cells in which Animals have been formed, or exiſted.

Moſt of theſe kinds of Bodies, *when perfect*, exhibit the Appearances deſcribed; but we often ſee theſe horny Shrubs in the Collections of Naturaliſts, without any calcarious Covering at all. It muſt not however be immediately determined, that they were ſo formed; ſince it is more than probable, that they have been diveſted of theſe Coverings, by the Violence of the Waves, and other like Accidents; by which they have been ſtripped of a Part, that ſeems not leſs eſſential to theſe Bodies, than the Bark is to Trees. This accidental Change in their external Habit, has, nevertheleſs, occaſioned ſome Difficulty to the Botaniſts; and induced even *Boerhaave* himſelf, to divide them into two Families, calling thoſe that had their native calcarious Covering *Titano-Keratophyta*; and thoſe that were diveſted of it, which on the Sea-coaſt will ſoon happen, only *Keratophyta*.

Notwithſtanding theſe ſtrong Circumſtances, to prove the animal Structure of thoſe ſubmarine Bodies, yet as there are many curious and ingenious Perſons, who ſtill remain unconvinced, it becomes neceſſary for us to ſcrutinize into the Nature of them with more Exactneſs.

Specimens

Specimens of a very young Growth, *viz.* 2 or 3 Inches high have the Appearance of a ſmall calcarious Sprig. When this is diſſected length-ways, and viewed with Attention, we find in the Centre, a ſlender horny Tube, with ſome whitiſh Matter in it like Pith; next to this Tube are other very ſmall Tubes of a calcarious Subſtance, that adhere to it, and ſurround it, covering over even the Point of the Top.

In more advanced Specimens, where they branch out, theſe fine calcarious Tubes ſend out little Cells of Animals of the Polype kind, with proper Openings to them all. Theſe Cells are diſpoſed along the Branches always in ſome regular Order, with great Exactneſs, according to the particular Species; not like the Neſts of Inſects on Plants, which are accidentally placed here and there; and which many imagine them to be; but in much the ſame preciſe Form and Manner, that we obſerve in the Cells of the Corallines.

From theſe Cells the Animals have been diſcovered extending themſelves, as well to procure Food for themſelves, as Materials for the Increaſe of this ſuprizing Structure: But this will be made clearer to us from ſome following Obſervations.

When Inſects infeſt a Vegetable, to devour its Leaves, and build their Neſts upon its Trunk and Branchs, they are rarely obſerved to cover the whole Bark from the Bottom of the Trunk, to the utmoſt Extent of its Ramifications: But, admitting this ſhould happen to be the Caſe, I believe it will be allowed, no-body ever ſaw Plants, ſo totally incruſted over with the Cells of Inſects, live and flouriſh after. It has been generally remarked, that real Sea-vegetables, of which there are a conſiderable Variety, are as much ſubject to be attacked by different kinds of Sea-Inſects, who build their Neſts on

them, as the Land-Plants are to their kinds; but then, it is as commonly obſerved, that they fare much alike, that is, they periſh and decay.

The Herring-bone Coralline deſcribed at Fig. *a*, Plate X. reſembles theſe *Keratophyta* in the Manner of its Growth very nearly, except in the Incruſtation, and is a miniature Figure of that pennated Species, called in the *Weſt-Indies* the Sea-Feather.

In order to ſhew the great Affinity there is between the Structure of the pennated *Keratophyta*, and the veſiculary Corallines with Denticles, I ſhall here give a ſhort Deſcription of a curious one from *Sardinia*, called the Sea-Feather, which I lately met with in the curious Collections of Mr. *Baker*, and Mr. *Pond*, Fellows of the Royal Society.

This beautiful marine Production is about a Foot high: The ſmall *Pinnæ*, or Side-Sprigs, are placed alternately oppoſite to each other, in a regular Order on each Side of the main Stem. Theſe are furniſhed with ſeveral little Cluſters of ſmall Tubercles placed at equal Diſtances, and ſurrounding the Stem generally three together. When they are magnified, they have much the Appearance of the bearing Buds of Fruit-Trees. In this dry Specimen their Tops bend in towards the Stem of the Branch that ſupports them.

The whole Surface is covered over with a calcarious Subſtance, like moſt of this Claſs.

Fig. *S*, in Plate XXVI. repreſents one of the Ramifications, with the main upright Stem; this, we may obſerve, has a very near Reſemblance to the Form of the Sea-Fir Coralline, Plate I. Fig. *b*, pag. 4.

Fig.

Fig. *T*, is a microſcopical Repreſentation of two of theſe Diviſions, with their little Tubercles.

One of theſe Diviſions being put into an acid *Menſtruum*, the calcarious Matter was eaſily diſſolved, and the two Side-Tubercles, at Fig. *V*, were exhibited to View, diveſted of their Cruſt or calcarious Covering; and here we plainly diſcovered two Polypes with their Claws or *Tentaculi* contracted. Theſe, we perceived, were both united to the main Body of the Animal, by a ſlender fleſhy Subſtance that proceeded from the Bottom of each. This fleſhy Subſtance, that conſtitutes the Centre of the Stem, or main Body of the Animal, we can eaſily trace through the Middle of the Stems and Branches of the *Keratophyta*, when the calcarious Covering is taken off.

In the ſame manner, we may perceive the Polypes by Pairs inſerted into the central fleſhy Stems of the veſiculary Coralline, N°. 7. Plate IV. at Fig. *C*, and in N°. 8. Plate V. at Fig. *A*.

I have now before me Specimens, that prove the horny Circles, which ſurround and compoſe the Stem and Branches, to be the Work of Animals; one particularly of the *Keratophyta*, or Sea-fans, called by the celebrated *Linnæus*, *Flabellum Veneris* (See Plate XXVI. Fig. *A*); which, by ſome Accident, has had one of the main Stems belonging to the Branches broke quite acroſs, at Fig. *B*. But the broken Parts have been kept near to one another by the ſmall reticulated Side-branches, at Fig. *D*. The Animals, in the Progreſs of their Tubes upwards from the Trunk, Fig. *K*, as ſoon as they met with this Obſtruction of the broken Stem, turned off to one Side, and proceeding along the reticulated Branches, towards *D*, covered over the vacant Spaces with their horny Plate XXVI. Fig. *C. D.*

and

and calcarious Matter. At the dark Part near *D*, the calcarious Tubes are taken off, on purpoſe to ſhew that the horny Parts underneath, which ſtill have the Appearance of Tubes, have taken the ſame Courſe and Direction with the calcarious ones, that ſucceeded and covered them. After this they made a ſhort Turn, to gain the broken End of the upper Part of the Stem of this Branch; and from thence they continued their Progreſs along it towards the finer Ramifications, as uſual.

Fig. *E*, repreſents two calcarious Tubes magnified: Theſe were cut off from the cortical Part of the Trunk, near Fig. *L*. The component Parts of the calcarious Matter are ſo magnified, that the particular Shape of them may be diſtinguiſhed, which is not unlike that of the red Coral.

Fig. *F* and *I*, repreſent a ſmall Sprig magnified, that was taken from the Top of this *Keratophyton*, at Fig. *O*.

Fig. *G*, is a ſmall Ramification of this Sprig, with the calcarious Surface thinly taken off, to diſcover the three Tubes, that run juſt under the Surface; the two Side ones appear to have ſmall Holes in them, as if the Animals communicated with the 2 Rows of Cells on the Sides. By cutting another very thin Slice, we diſcover both the horny Tube in the Middle, and the two Rows of Cells; which are both expreſſed on the oppoſite Ramification, at Fig. *H*.

In each of theſe Cells we plainly diſcover a ſmall Polype, of the Size of the Figures at *N*, and of the ſame Shape with the magnified Figures at *M*. This Specimen was lately brought from the *Weſt-Indies*; the Animals were very diſtinguiſhable, but contracted: The dark Holes on the Sides of the Stem, and lower Branch of this magnified Sprig, *F* and

I, are the Holes from whence the Polypes extend themſelves.

Fig. *I*, is the lower End cut ſloping off, to ſhew the Cavities of the Tubes and Cells.

In the Centre of the Section is the End of the compreſſed horny Tube. The ſmall reticulated Branches of this *Keratophyton* are much compreſſed; and when we view them in Front, their thin Edge ſtands towards us.

Fig. *K*, is the horizontal Section of this great Branch, ſhewing the ſeveral circular Layers of contracted Tubes, which now look like the annular Circles of Wood.

In the ſame *Keratophyton*, or Sea-Fan, is another remarkable Inſtance of the Animals forming the horny Part of the Branches.

This Specimen appears to have the Progreſs of its Growth ſtopt by ſome impending Rock, or other Accident; Part of its upper Branches appearing as if cut off in a Line horizontally, Fig. *c*. This we obſerve has diverted the Courſe of the Animals back the Way they came, ſo that we find many of the late formed Cells covered over, and confuſed with an irregular Appearance of the calcarious Matter. This we can perceive, as far as we can trace the Animals back in their Retreat; and, upon taking off the calcarious Matter, we find, that the horny Subſtance, which they have depoſited ſince their Return, had filled up moſt of the vacant Places, in that Part of the Reticulation.

Beſides the horny and woody Subſtance of the Stem and Branches of theſe *Keratophyta*, I have lately met with one from *South Carolina*, in the Collection of Mr. *Peter Collinſon*, F. R. S. whoſe inward Parts are intirely of a ſpongy Texture,

ture, and the whole Subſtance of it, feels as light as Cork.

The outward Surface is compoſed of a mealy friable Matter of the Colour of red Lead, not unlike the Covering of the common red Coral, as it is brought to us, when firſt taken out of the Sea, but fuller of little ſtarry Holes. The Matter that compoſes the Cells which lies immediately under this, has ſome Degree of Tenacity, and the internal Part is ſtill more compact, and conſiſts of a faint red ſpongy Subſtance.

The Surface of the principal Stems are ſurrounded by parallel Tubes: Theſe Tubes we may trace up along the Branches, till they change inſenſibly into Rows of Cells, as we may obſerve in ſome of the celliferous Corallines.

Fig. *P*, Plate XXVI. is a Repreſentation of a ſmall Piece of this ſpongy *Keratophyton*, in its natural Proportion.

Fig. *Q*, is a Piece of the Top of one of the Branches, cut perpendicularly through the Middle, to ſhew the Situation of the Cells. Theſe Rows of Cells ſurround the young Branches on all Sides; and the ſpongy Parts between them appear in the Microſcope to be full of irregular tubular Cavities.

The internal ſpongy Part of this Species is more intimately united to the cellular cortical Part, than in any other Species we have yet ſeen.

Fig. *R*, is the horizontal Section of the ſame Branch, to ſhew the Diſpoſition of the ſeveral Rows of Cells, ſurrounding the ſpongy central Part.

I have obſerved, in ſome Specimens of the pennated *Keratophyton*, or Sea-Feather, that, when the Whole, or Part of it,

it dies, the Animal of the *Millepora* Coral Kind frequently incruſts its dead Branches with a white coral Matter, ſo that many Perſons have been deceived by not examining it carefully, and have taken it for a calcarious, inſtead of a ſtony, Incruſtation. But, beſides the Difference of the Materials of which theſe Coverings are compoſed, the Irregularity of the Coral is eaſily to be diſtinguiſhed, from the great Exactneſs of the natural Incruſtation.

Another Obſervation naturally follows this; and that is, we never find upon one and the ſame Species of *Keratophyton*, two different kinds of calcarious Incruſtations. Notwithſtanding I have ſeen three different Species of *Keratophyta* adhering to one Piece of Rock-coral; and in the ſame Piece, Part of a dead *Keratophyton* incruſted with the Coral.

The Particles of this cortical Cruſt, which are of a peculiar Figure in each Species, are often deeply impreſſed into the laſt Row of Tubes, which are now become woody or horny, from having their calcarious Parts mixed with the glutinous Parts of the Animal, and are the preſent Surface of the inner Part.

No Bark, Membrane, or other outſide Covering, are ever found on this Genus of marine Productions, except this cellular calcarious Coat, which ſhews it to be its natural one.

Whoever has carefully examined the upright and croſs Sections of Trees and Shrubs, or even the Stems of Sea-plants, will find, that the longitudinal Veſſels of the woody Parts are always connected together by lateral Fibres, or have lateral Tubes. But on the niceſt Enquiry we could make with the Microſcope, we could never diſcover any of theſe connecting Fibres, or Tubes, proceeding from the Pith

to the Circumference, among the compreſſed longitudinal Tubes and Veſſels of theſe *Keratophyta*; ſo that the Viſcidity, derived from the Animals, ſeems to be the chief Cauſe of theſe Tubes uniting ſo cloſely together; for in ſome particular Specimens from the hotteſt Climate, they form a Body much harder than Wood, eſpecially after they are become very dry.

If we examine the ſtony red Coral of the *Mediterranean* Sea, we ſhall find a great Affinity between it and the *Keratophyta*, in Texture, and chemical Productions; only the Ramifications are very ſhort, and the Tubes turn to Stone inſtead of Horn. But if we conſider the Courſe of the Tubes in each, the Manner of their ſurrounding the Stem, augmenting its Circumference and that of the Branches, its rough, friable, bark-like Surface, together with the ſtarry Openings of the Cells, we muſt think they are not far removed from each other, in the great Scale of Nature.

We frequently meet with Specimens among the reticulated *Keratophyta*, where the Animals, in their Progreſs up the Stems and Branches, paſs with their Tubes over, and incloſe, ſmall Shells, and other extraneous Bodies.

Something of the ſame kind is found in the Progreſs of the Animals, that form the red Coral, the Tubes of theſe are often found ſurrounding, and ſpread upon a great Variety of Subſtances.

As many of the Sea-plants, I mean thoſe that are undoubtedly of a vegetable Nature, diſcover ſome kind of Seed-veſſels, we ſhould naturally expect they would be manifeſt enough on the largeſt kind of this Tribe of Sea-productions; for we have been informed, from very good Authority, that, upon the Coaſt of *Norway*, ſome of theſe Species have been ſeen to extend

Plate XXVII.

extend themſelves 16 Feet in Length; whereas, I believe, no-body has yet ſeen the leaſt Tendency to Fructification in theſe Bodies, unleſs what appears in the cellular cortical Part ſhould by any be deemed ſo; notwithſtanding Obſervation, and many Experiments, ſhew us plainly that this has much greater Affinity to the Work of Animals.

Laſtly, The chemical Experiments, that have been made on theſe Bodies, are a ſtrong Proof, if there were no other Demonſtrations, of their being animal.

I need not mention any other to the curious, than the great Quantity of volatile Salts, that may be extracted from them, and the ſtrong Smell they yield, when burnt, of roaſted Oyſters.

We have as yet met with but two kinds of *Keratophyta* on theſe Coaſts, and even theſe are rare. The firſt is;

N°. 1. *Keratophyton flabelliforme, cortice verrucoſo obductum.* R. S. pag. 32. Warted Sea-fan. Plate XXVII. Fig. *a*.

This was found on the Coaſt of *Cornwall*. The Outſide of it is covered over with a Cruſt, full of little Lumps like Warts; which, when diſſolved in Vinegar, diſcover the contracted Bodies of Polypes, with eight Claws.

Fig. *a*, N°. 1. repreſents a ſmall Sprig of this *Keratophyton*.

Fig. *A*, and *A* 1, are two Views of one of the Warts magnified.

Fig. *A* 2, is the Appearance which the Polype made, when the cretaceous Matter was diſſolved.

Fig. *A* 3, repreſents the Particles magnified, that compoſe the Incruſtation.

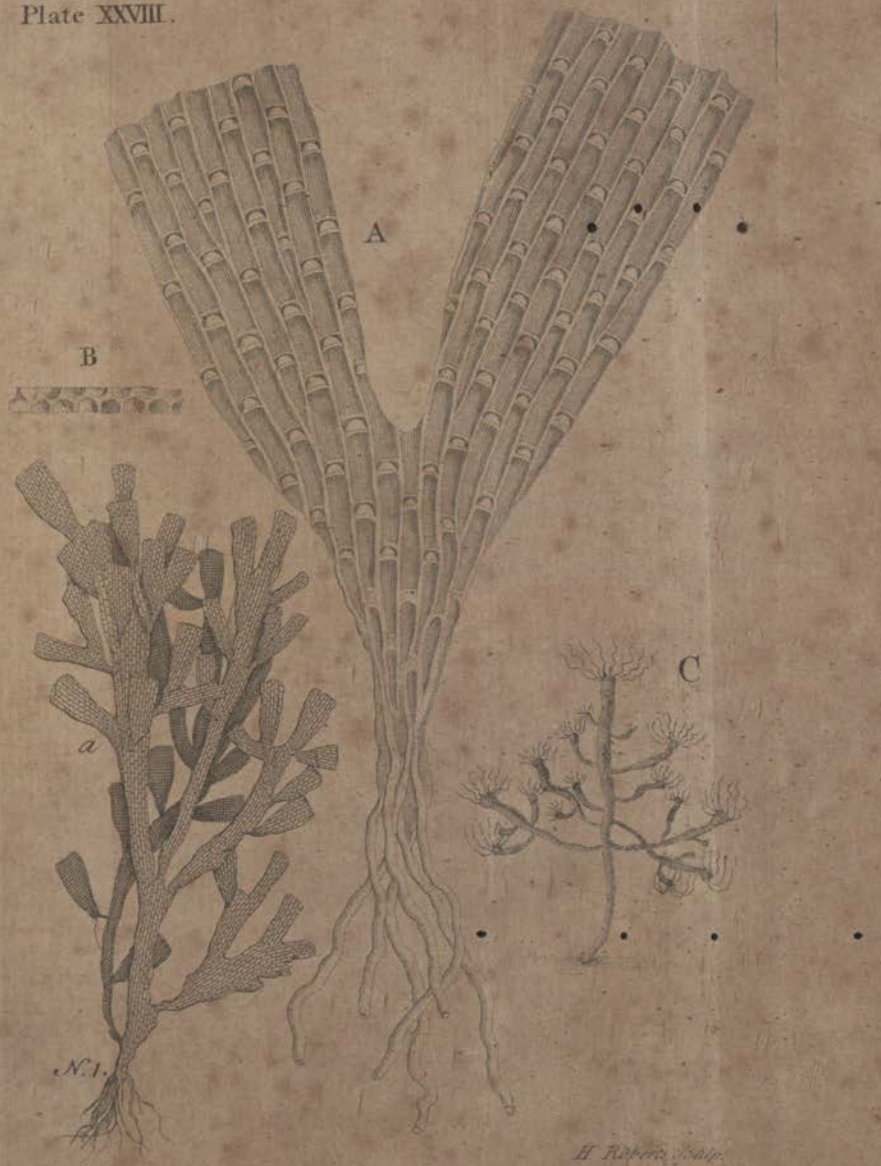
Plate XXVII. Fig. g. N°. 2. *Keratophyton dichotomum, caule & ramulis leviter compreſſis.* R. S. p. 32.
Sea-willow.

This was found on the Coaſt near *Margate,* and ſome Specimens of it have been lately received from *Ireland.*

On both Edges of the flat Branches are regular Rows of little riſing Cells in the calcarious Part, with ſmall Holes for an Entrance to each.

Fig. *g*, N°. 2. is a ſmall Sprig of this *Keratophyton*, in its true Proportion.

Plate XXVIII.



CHAP. VI.

Of the Eſchara.

THOUGH theſe Bodies properly belong to the *Millepora*, yet, as I have generally followed the celebrated *Ray*, I ſhall keep to his Appellations; adding ſuch a Deſcription to each, as may enable the Naturaliſts eaſily to rank them in their proper Places.

My Author's Characteriſtic of this Claſs is, that their Surfaces ſhould reſemble that of a Web of Cloth. And the Microſcope informs us, that they conſiſt of Arrangements of very ſmall Cells, whoſe Surfaces appear much in that Form.

The very near Reſemblance, that the two firſt of the following *Eſchara* bear to Leaves of Plants, has given Occaſion to the botanic Writers to claſs them among the *Fucus's*.

N°. 1. *Eſchara foliacea, millepora, tenera anguſtior, foliolis quaſi abſciſſis, & cellulis oblongis alternis utrinque inſtructa.* *Fucus marinus, ſcrupoſus, albidus, anguſtior, compreſſus extremitatibus quaſi abſciſſis.* H. Ox. III. pag. 646. R. S. p. 43. Narrow-leaved Hornwrack. Plate XXVIII. Fig. *a. a.*

The eaſy Tranſition in the Order of Nature, from the laſt Claſs which was the *Keratophyta*, to the firſt of this, is remarkable; for, in this Species, the Rows of Cells continue to proceed from ſmall Tubes, that unite together, and form a kind of Stalk: This divides, as it riſes, into narrow Leaves, made up of regular Rows of oblong Square ſhaped Cells, placed alternately by each other, and oppoſite to an equal Number on the other Side of the Leaf, like the Honeycomb: From

theſe

theſe Leaves proceed other ſtill ſmaller foliaceous Ramifications, many of which ſeem to be connected at the lower Part by *Tubuli*, as in the Corallines; by which Means they can ply to and fro more freely in the Water.

Fig. *a*, N°. 1. gives the natural Appearance of this Coralline.

Fig. *A*, repreſents two Leaves, with their *Tubuli* and Cells magnified.

Fig. *B*, is a croſs Section of one of the Leaves at *A*, ſhewing the Partition, and inner Form of the Cells.

Plate XXIX. Fig. *a. A.* N°. 2. *Eſchara foliacea, Millepora, ſpongioſa, cellulis arcuatis alternis utrinque inſtructa.*

Fucus telam lineam, ſericeamve, textura ſua æmulans. R. S. N°. 9. p. 42.

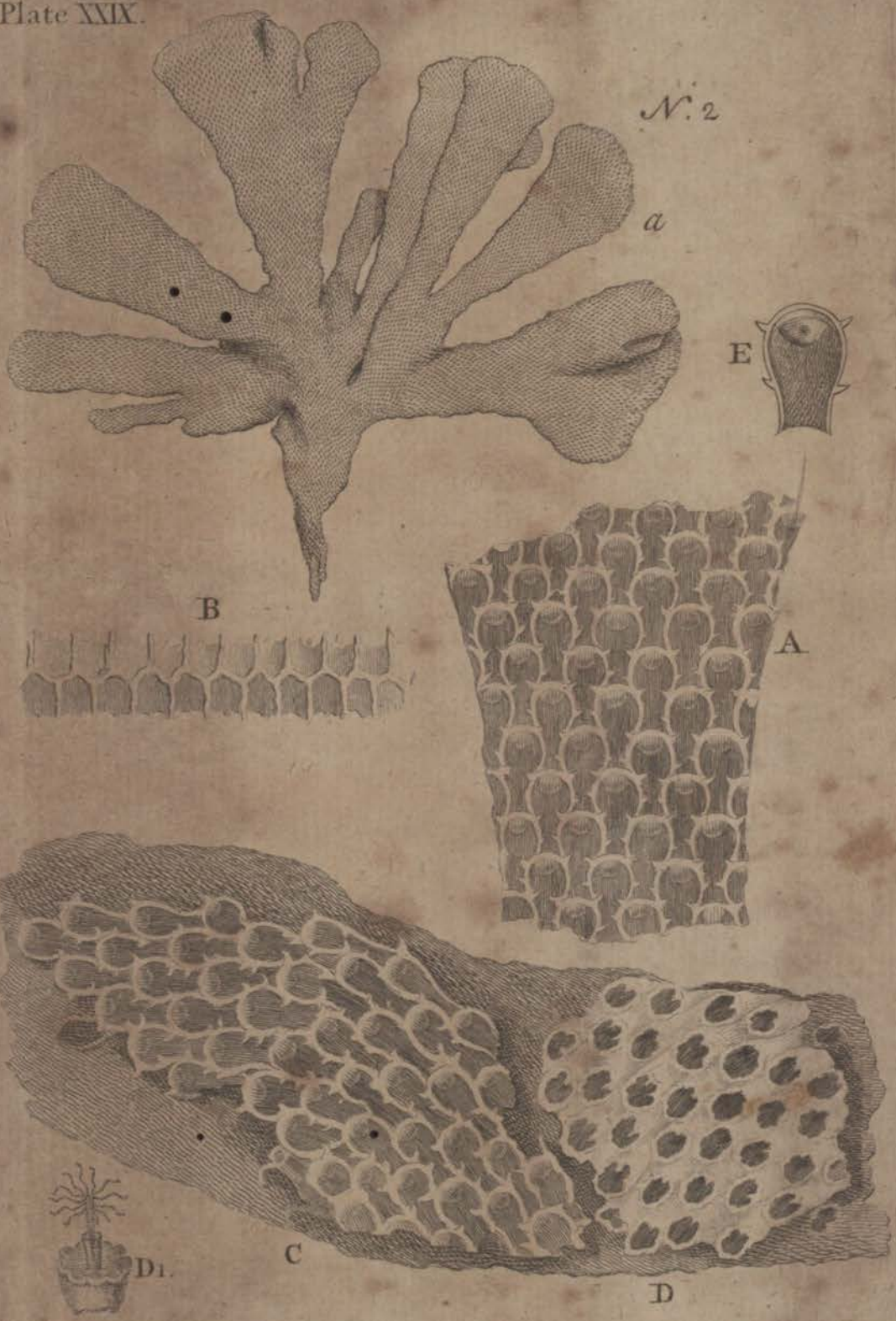
Broad-leaved Hornwrack.

This Coralline, when freſh taken out of the Sea, is of a ſpongy ſoft Texture, and ſmells very fiſhy; but when it has lain for ſome time on the Shore, it becomes ſtiff and horny, like ſome Sort of withered Leaves. Both Surfaces, when examined by Glaſſes, appear to be covered with Cells; and, when a Piece of it is cut acroſs, one may diſcover the thin Membrane that ſerves as a Baſe to the Cells of each Surface.

The Form of the Cells is very remarkable, each one being arched at the Top, and contracted a little at the lower Part of the Sides, to make Way for the Arches of the two next adjoining Cells, ſo that, by this particular Conſtruction, no Room is loſt. The Entrance of the Cells is immediately under the Arch of each Cell, and the Walls of the Cells ſeem to be fortified with Spines.

The

Plate XXIX.



The celebrated Doctor *Bernard Juſſieu* diſcovered ſmall Polypes extending themſelves out of theſe Cells, which he has deſcribed in the Memoirs of the Academy of Sciences for the Year 1742.

Upon examining ſome Specimens lately, I diſcovered, at the Entrance of many of the Cells, a ſmall teſtaceous Body, like a bivalve Shell.

The Figure of the Cell, with the Shell in it, is magnified at *E*, Plate XXIX. It is of a tranſparent Amber-colour, ſo clear that one may ſee the dead Animal through it, repreſented by the black Spot.

Fig. *a*, N°. 2. gives us the natural Appearance of a leafy Branch of this Coralline.

Fig. *A*, is a Part of a Leaf magnified to ſhew the ſuperficial Figure of the Cells, and the Manner in which they are diſpoſed.

Fig. *B*, ſhews a croſs Section of a Leaf, and diſcovers the ſeveral Partitions of the Cells.

Fig. *C*, ſhews the ſame Cells in ſingle Ranges, or Surfaces, creeping on a *Fucus*, with the Cells of the common Sea-Inſect that infeſts all marine Bodies on theſe Coaſts.

N°. 3. *Eſchara foliacea, millepora, lapidea, extremitatibus hinc inde irregulariter coaleſcentibus, utraque ſuperficie ex cellulis ovatis conſtans.* Plate XXX. Fig. *a. A.*

Eſchara retiformis. R. S. p. 31. *Reticulum marinum.* J. B. III. 809.

Stony foliaceous Coralline

This ſtony *Millepora* was found growing to an Oyſter-ſhell, on the Weſt Coaſt of the *Iſle of Wight*, in *April* 1753; and, when

when it was received, the Inſects were viſible in the Cells, but dead.

Fig. *a*, N°. 3. repreſents the exact Appearance of it, growing on a ſmall Oyſter-ſhell.

Fig. *A*, is a Piece of the Surface, magnified to ſhew the Entrances of the Cells.

Fig. *B*, is a croſs Section, and *C*, an upright Section, to ſhew the inward Form and Partitions of the Cells magnified.

Plate XXX. Fig. *b*. Fig. *b*, is a Piece of *Italian* Coral, ſhaped like a Stag's Horn, and called by *Imperatus*, *Porus cervinus*. It is introduced here to ſhow, that upon magnifying it in ſeveral Views, the outward and inward Form of the Cells are exactly the ſame with this before us.

Plate XXX. Fig. *d. D.* Fig. *D*, is the magnified Appearance of Fig. *d*. This ſhews the ſame ſhaped Cells ſurrounding a *Fucus*; but theſe are made of ſofter Materials. Their Entrances are guarded by Spines; and their Surfaces are fuller and rounder, than thoſe of the ſtony Coralline, being of a ſpongy Texture. For the ſtony ones, from being plump and round, when they were quite freſh from the Sea, ſunk almoſt to a flat Surface, as they became dry.

Plate XXV. Fig. *d. D.* To this I ſhall add a Deſcription of that beautiful *Millepora* called, the *Retepora eſchara marina*, of *Imperatus*, pag. 630: becauſe this has been taken for the *Eſchara retiformis*, of *Ray*, juſt deſcribed.

This is found growing to Shells and Rocks on the *Italian* Shore, in irregular leafy Figures, but very often in the Form of a Cup, or Drinking-glaſs, irregularly expanded at the Brim. As at Fig. *d*, in Plate XXV. it is made up of a Combination of Inſects Cells, the whole Subſtance is regularly pierced

Plate XXX.

Plate XXXI.

J. Kirk Sc.

pierced with Holes quite through, which gives it the Appearance of a Net. The Spaces between the Holes, on the Inſide of this Coral, are full of the ſmall Entrances into the Inſects Cells, which are preſented magnified at Fig. *D*.

The Back or under Part of the Coral is magnified at *F*, to ſhew that there is no Opening to the Cells on that Side.

N°. 4. *Eſchara millepora, foliacea & ſpongioſa, cellulis, coni inverſi formâ, oribus ſetaceis.* Plate XXXI. Fig. *a. A.*

Irregular ſpongy foliaceous Coralline.

The common Sea-inſects Cell, with which moſt marine Bodies are over-run, is now-and-then found raiſing itſelf into a leafy Figure, like the preceding Corallines; but the ſame great Regularity and Order is not ſo ſtrictly obſerved in the Diſpoſition of the Cells.

Fig. *a*, N°. 4. gives us the natural Appearance of this irregular ſpongy Coralline, Part of which is magnified at Figure *A*.

Fig. *b*, repreſents the Manner in which theſe Inſects ſurround and inveſt ſome of the *Fucus's* with their Cells.

This has given many ingenious Perſons an Opinion, that the *Keratophyta* are of the ſame Nature; that is, that they are no more than Sea-plants, on which different Species of Sea-Inſects build their calcarious Neſts; but this, we hope, has been already explained ſufficiently; and ſome of the miſtaken Notions, concerning their Formation, removed.

Fig. *D*, in Plate XXIX. repreſents ſome of the ſame Kind of common Sea-Inſects Cells magnified, as they were found adhering to the ſame *Fucus*, with the arched Cells of the ſecond *Eſchara*, or foliaceous *Millepora*; only the Matter, of Plate XXIX. Fig. *C. D.*

which theſe are formed, is of a firmer Nature; it was taken out of the Sea, at a great Depth, near *Falmouth*; looks ſmoother and whiter than this now before us, and is without Hairs.

While I was at *Brighthelmſtone*, I had an Opportunity of ſeeing the Animal, which belongs to theſe Cells. It is a Polype with 12 *Tentaculi*, incloſed in a ſmall Tube, in the Middle of the Cell, as it is repreſented magnified, at Fig. *D* 1, in Plate XXIX. When they are diſturbed, they draw themſelves into their Tube or Sheath, which cloſes on them; and ſink, together with it, into their Cells.

Plate XXV. Fig. *e*. N°. 5. *Eſchara millepora arenoſa Anglica.* R. S. p. 31. *Lorica marina Imperati.* 688.
Engliſh ſandy *Millepora.*

Upon examining this Sea-production in the Microſcope, it appears to be a Collection of Sand, united by the viſcid Matter of ſome Sea-Inſects, and diſpoſed in a flat thin Surface, full of ſmall Cavities, where the Inſects have been.

Fig. *e*, in Plate XXV. is the natural Size of a Part of it.

Plate XXVII. Fig. *e. E.* N°. 6. *Eſchara millepora, minima, cruſtacea, dilute-purpurea, cellulis tubiformibus, ordine fere equali, & parallelo diſpoſitis.*
Small purple *Eſchara.*

This Incruſtation is compoſed of circular Rows of very ſmall, and almoſt parallel Pipes, of a ſemitranſparent faint purple Colour. It is found ſurrounding the Stalks of *Fucus's*, and the denticulated Corallines.

Fig. *e*, N°. 3. Plate XXVII. is the natural Appearance.

And

And Fig. *E*, the magnified one of this Incruſtation. This belongs properly to the *Tubularia* of *Linnæus*.

N°. 7. *Eſchara millepora lapidea, inſtar pumicis poroſa.* Porous *Eſchara.* Plate XXVII. Fig. *f. F.*

This ſtony Incruſtation is often found on the ſickle Coralline, in irregular Lumps, appearing like white Sand ſtrongly united together. But in the Microſcope, it ſeems to conſiſt of an infinite Number of ſmall round Cells, placed in no regular Form, only the circular Entrance to the Cells appears on the Outſide of each; ſo that, in the Microſcope, it looks like a Pumice-ſtone.

Fig. *f*, N°. 4. exhibits the natural Size of the Cells, which are magnified at Fig. *F*. But the Incruſtation itſelf is often found much larger than the Size of the magnified Part *F*.

CHAP. VII.

Of the Engliſh Corals.

THE Definition, that *Ray* gives us in his *Synopſis*, of Coral, is this, that it is a kind of Plant almoſt ſtony, branched like a Shrub without Leaves, and with no viſible Pores.

Plate XXVII. Fig. C. N°. 1. *Corallium pumilum album, fere lapideum, ramoſum. Corallium album pumilum noſtras.* R. S. p. 32.
Iſis. Linæi Genera. 974.

This conſiſts of ſhort irregular Ramifications of a chalky Appearance, and ſtony Subſtance (See Fig. *c*, N°. 1). But, when highly magnified, appears full of ſmall Pores, not unlike thoſe in Fig. *B*, Plate XXIV.

Great Quantities of this Kind are dredged up near *Falmouth*, and uſed by the Inhabitants, with Succeſs, to manure their Land. See the Obſervations on this Coral in *Ray*'s *Synopſis*, under this Article.

I lately received ſome Specimens of a faint purple, or livid red Colour, that had been dragged up in the Nets of the Herring-Fiſhers, near the *Iſle of Man*; as alſo from *Ireland*, ſome Specimens of this Genus, reſembling a Bunch of very ſmall Grapes of a whitiſh Colour.

Plate XXVII. Fig. *d. D.* No. 2. *Corallium cretaceum lichenoides.*
Corallium maritimum calcariis rupibus adnaſcens. Mor. H. Ox. III. p. 651.
Chalky Coral, ſhaped like Liverwort.

This chalky Incruſtation is found in great Plenty on the

Coaſt of *Cornwall*, growing to Rocks and Shells. The Surface of this Coral, upon a nice Examination, appears full of ſmall Pores, which almoſt diſappear, if they have been kept any Length of Time from the Sea. A ſmall Piece broken off, and placed in the Microſcope, exhibits ſideways a View of ſeveral Stages of Cells, divided from one another, as at Fig. *D*.

If a Piece is put into Vinegar, the chalky Part ſoon diſſolves, and the Partitions and Cells become very viſible. The membranous Part, remaining unaffected by the Acid, makes it probable that it is of animal Conſtruction.

Fig. *d*, N°. 2. repreſents a Piece of this Coral, adhering to a Limpet's Shell.

We often meet with Specimens of the green *Conferva*, or Silk-weed, that grows on the Rocks, with its ſlender Branches ſurrounded by thin Incruſtations of this Coral; and ſome of the broad thin *Fucus's*, with their Surfaces almoſt covered with it.

CHAP. VIII.

Of Sponges.

THAT this Claſs of marine Bodies is of an animal Nature, was an Opinion that prevailed ſo early as in *Ariſtotle*'s Time For in his *Hiſtoria Animalium*, Book V. Chap. 16. he tells us, "Many People were of Opinion, that Sponges "were capable of Feeling, and that they would ſhrink back, "if any one attempted to pluck them up." *Ariſtotle*, however, rejected this Notion; as did moſt of his Followers: Though it ſeems not improbable, but that thoſe, who firſt broached it, had ſome kind of Experience, as a Foundation for their Opinion; ſince, if the Sponges ſhould be found to be the Habitation, the Fabric of Polypes, or *Animalcules* of a particular Order, no doubt but the ſudden Retreat of many thouſands of theſe together, into the Holes they reſided in, upon the Approach of Danger, would give the Perſon, who was wreſting the whole Colony from its fixed Abode, a Senſe of a different Species of Reſiſtance, from that which a Subſtance, not animated, could be ſuppoſed to do.

There are not many Kinds of Sponges on our own Coaſts; and theſe, for the moſt part, are minute and tender. We ſeldom meet with them, 'till after they have been long ſeparated from their Places where they grew; and of courſe the Organization greatly injured. So that, notwithſtanding I have examined with the utmoſt Attention, moſt of thoſe that our own Coaſts afford, and likewiſe a great Variety of different Species of Sponges, with which the Cabinets of ſeveral of my Acquaintance here are furniſhed, yet I own it is not in my Power to give ſo explicit an Account of the Structure

Structure and Uſes of the ſeveral Parts of this Claſs of Bodies, as would be ſatisfactory: And, indeed, this can ſcarcely be expected from any, but thoſe who live near the Places where the Sponges are found, and who have Leiſure and Abilities to conſider them while recent.

If we carefully examine a ſmall Part of one of thoſe Sponges, whoſe Ramifications are large and diſtinct, in the Microſcope, we find that they riſe from many ſmall Tubes; theſe, as they extend themſelves upwards, ſend out Side-branches in various Directions, which inoſculate, and, uniting thus with each other, form a compound Reticulation quite through the Inſide of the whole Maſs. In viewing the Extremities of the upper or laſt Shoots, we perceive ſmall Openings at the End of their Fibres; and as we trace theſe Fibres back from the Opening downwards, we ſee a ſoft whitiſh Subſtance, which fills the internal hollow Part of all the Ramifications, through the whole Sponge; which Ramifications have much the Appearance of tranſparent Catgut of an Amber-colour; and, doubtleſs, are the Lodgments of Animals of a particular Claſs. For, though we cannot diſtinguiſh either Veſicles, or Cells; or diſcover any other kind of Organization, than that of a hollow Tube variouſly inflected, and wrought together into a Multitude of agreeable Forms; ſome branched like Corals; ſome expanded like a *Fungus*; ſome riſing up ſtrait like a Column; others broad at Top, a narrow Baſe, and hollowed like a Funnel, with regular Cavities, Entrances, or Apertures, which are nearly alike in all Sponges of the ſame Species: Yet, from many obvious Reſemblances to divers other Claſſes of Sea-productions, which are found to be of animal Conſtruction, and from the chemical Analyſis of Sponges in general, there ſeems ſufficient Reaſon to induce us to give them a Place here with the reſt; though

tho', for Want of proper Opportunities to examine them while recent, I cannot exhibit ſo circumſtantial an Account of them, as hath been done of the other Claſſes of Sea-productions.

Of the ſeveral kinds of Sponges, found upon our Coaſt, I ſhall only mention two, as I have not been able to procure Specimens of the reſt ſufficiently perfect.

Plate XXXII. Fig. *f. F.* N°. 1. *Spongia ramoſa Brittanica.* Park. 1304. R. S. pag. 29. N°. 1.

Branched *Engliſh* Sponge.

The fibrous Ramifications of this Sponge are extremely fine, tender, and tranſparent, of a pale yellow Colour, and moſt curiouſly interwoven. The Branches riſe irregularly, but upright; they frequently inoſculate with one another, and are a little compreſſed along the Edges of the Sides. At certain regular Diſtances, we may obſerve ſmall circular Holes, which ſeem regularly worked, in the Manner we find them in the Webs of Spiders.

Fig. *f*, Plate XXXII. gives us the natural Appearance of a Branch of *Engliſh* Sponge, with the Entrances of the Cavities along the Edges, at Fig. *g*.

Fig. *F*, is a Piece of the Top of this Sponge magnified.

Plate XVI. Fig. *d.* N°. 2. *Spongia medullam panis referens.*
Alcyonium ramoſum molle, medullæ panis intus ſimile. R. S. pag. 31.

Sponge, like Crumb of Bread.

This Sponge is of a very irregular Shape, and whitiſh Colour, growing often round *Fucus's* and Corallines. The whole Surface is full of Holes, viſible to the naked Eye; and, when it is examined by the Microſcope, all the Interſtices

Plate XXXII.

ſtices between thoſe Holes are filled with other minute ones; theſe have a regular roundiſh Entrance to each, and ſeem to be compoſed of ſmall Bundles of minute tranſparent Fibres, that croſs one another, as if conſtructed by ſome Animal: Theſe Fibres, or rather *Spiculæ*, are ſo extremely fine and ſharp, that they affect the Skin like Cow-itch.

Fig. *d*, Plate XVI. is the natural Appearance of a Piece of this Sponge; but in general it is found branched out.

The ſmall Piece, at Fig. *d* 1, is magnified to the Size of Fig. *D* 1, to ſhew the Manner in which the Bundles of minute *Spiculæ* are laid, to form the ſmaller Holes that cover the Surface.

CHAP. IX.

Of the Alcyonium.

THIS Claſs of marine Bodies is, by Mr. *Ray*, placed after the Sponges, and is called a kind of Plants growing in Water, formed like *Fungus's* of various Figures, and with different Sorts of Covering; ſome having a gritty, and ſome a callous Skin, with a ſpongy Subſtance in the Inſide. Other Species are of a fleſhy Subſtance.

Cæſalpinus was of Opinion, that this Claſs of Bodies was compoſed of the Froth of the Sea, differently modified, and of different Colours, and grew to Rocks in the Manner of Sponges.

At preſent, we ſhall conſider it as conſiſting of ſuch marine Subſtances (chiefly the Neſts and Matrices of Sea Animals) as are not reducible to any other Claſs.

Plate XVII. Fig. *b. B.* N°. 1. *Alcyonium pulmonis inſtar lobatum.*
An Pulmo marinus alter Rondeletii 132? R. S. p. 31. N°. 3.
Sea Fig.

This Sea-production is of a dark Olive-colour, of a fleſhy Subſtance, and ſmells very diſagreeably when it is opened; the Inſide is full of little oblong yellow Particles, from whence it borrows the Name of the Sea Fig among the Fiſhermen, from whom it was procured, with many other Things of the like kind, at *Whiteſtable*. As ſoon as I received it I put it into Spirits, in order that I might examine it more minutely, being thus kept from ſhrinking.

The

The natural Size is repreſented at Fig. *b.*

When I applied my Glaſs to it, I found the whole Surface covered with ſmall Stars of ſix Rays, like ſmall Polypes of ſix Claws.

Fig. *C*, gives you the Appearance it made when magnified.

Upon opening it, I found the Inſide conſiſted of a great Number of little Bags of a yellowiſh Colour, full of a clear viſcid Liquor; in the midſt of this was a ſmall Duct leading to the Centre of the Star at the Top of each. This Section is repreſented magnified at Fig. *B.*

In examining one of theſe Bags attentively, I diſcovered ſeveral regular Figures, like Shells, in this inner Tube or Duct, placed upon one another. But whether they are the Food of the Animal in the Gut or Stomach, or whether it is the Ovary, I am not certain.

Fig. *D*, is the true Appearance magnified.

N°. 2. *Alcyonium ramoſo-digitatum molle, aſteriſcis undiquaque ornatum.* R. S. pag. 31. N°. 2. Plate XXXII. Fig. *a. A.*

Dead Man's Hand, or Dead Man's Toes.

This extraordinary Sea-production is indebted for its *Engliſh* Name to the Fiſhermen, who often take it up in their Nets, when they are trawling for flat Fiſh. It is met with very frequently on the *Kentiſh* Coaſt.

The ſmall Specimen repreſented at Fig. *a*, is exactly drawn from Nature. This was taken near the *Buoy of the Nore*, ſticking, as it is repreſented, to a ſmall Oyſter-ſhell; and ſent to me in Sea-Water quite recent, which gave me the better Opportunity of examining it carefully.

When it firſt came, I obſerved the Surface full of ſmall *Papillæ*, with a Star of eight Points on the Top of each. After it had been ſuffered to reſt for ſome time in the Salt-Water, each ſmall Star ſent forth a Polype, with eight *Tentaculi*, or Claws, in the Manner exhibited in the magnified Specimen at *A*.

In magnifying one of the Polypes a little higher, I obſerved, that each *Tentaculum*, or Claw, had, on both Sides, Rows of minute ſhort Fibres, like the Down on ſome pappous Seeds of Vegetables. This is repreſented at Fig. *A* 2.

In the ſtony Coral, found on the Shore near *New York*, I obſerved ſomething very ſimilar to this fleſhy Kind of Coral. A Piece of this ſtony Coral is repreſented at *A* 1. And one of the Stars is magnified a little, to ſhew the Marks left by the ſame Kind of ſmall Fibres of the *Tentaculi*, in the Rays of this ſtarry Figure, as at *A* 3.

When the Water became putrid, the Animals in the fleſhy Coral died, and the whole Subſtance ſmelt cadaverous. It was afterwards dried, in which Condition it ſhrunk up to a ſpongy light Subſtance.

Plate XXXII. Fig. *b. B.* N°. 3. *Alcyonium, ſeu Veſicaria marina.* J. Bauhin. Sea Waſh-balls.

This marine Production is compoſed of ſmall yellow Bladders of a compreſſed globular Shape, connected together in Form of a Ball, and very tough. It is found very frequently thrown up on our Shores, and uſed by the Sailors as Soap to waſh their Hands.

Upon diſſecting ſome of theſe Bladders, I found them to be the Ovaries, or *Matrices*, of our common *Buccinum*, or Whelk; each diſtinct *Matrix* is about the Size of half a large Pea,

Pea, and contains ſeveral embryo Shells; which, as they approach towards Maturity, diſtend their Covering, and force open a Valve-like Door, ſituated in the front Edge of this little Bladder, by which they creep out, and ſhift for themſelves.

Fig. *b*, Plate XXXII. is the natural Size of one of theſe Balls.

Fig *b* 1, is a ſingle *Matrix*, or Bladder, laid open, to ſhew the natural Size of the embryo Shells.

Fig. *B*, is the ſame, a little magnified, with the Valve in the Front.

The wonderful Care that Nature takes in the Productions of ſome of the ſame Tribe of Shell-fiſh, is ſhewn in a ſtill more ſurprizing Manner in that Species of *Buccinum* called by Doctor *Liſter*;

Buccinum ampullatum clavicula ſulcata, una parte cujuſque orbis in planum compreſſa. Liſter, Plate 878, and 879. Plate XXXIII. Fig. *a. A.*

Called by ſome, the Tower of *Babel* Fig-ſhell.

This breeds in great Plenty on ſome of the Coaſts of *North America*, eſpecially on the Shore from *New York* to *Virginia*.

The Ovaries, or *Matrices*, are of a compreſſed oval Form, and ſome of them of the Shape of the Limpet, or *Patella*, but flatter at the Top.

Theſe are united on one Side to a tough pliable Ligament, ſo near to each other as to ſeem to lie on one another. On the front Edge, oppoſite to where they are faſtened, is the arched Door, by which the young ones, when they

they are capable of providing for themſelves, make their Retreat into the Sea.

The Valve that covers this Door, during their minute State, is a moſt curious Contrivance, to preſerve the tender Animals from the Sea-Water, till they are able to venture into it.

During their Confinement, they are covered with a Slime like the White of an Egg; which, no doubt, nouriſhes and promotes the Growth of the young Animals.

If we attentively conſider this String of Ovaries, we ſhall be apt to conclude, that both they, as well as the Animals, grew after they were depoſited by the Parent Whelk; for they appear by much too large for even the largeſt of this Tribe ever to have contained. At firſt Sight, they have the Appearance of ſomething belonging to the vegetable Tribe, and are not unlike the Strings of Seed-Veſſels of the Hop Hornbeam.

Fig. *a*, Plate XXXIII. repreſents one of theſe Strings of *Matrices* of the *Virginia* Whelk of a middling Size. This appears to have been faſtened to ſome Rock, or other ſolid Body, by the upper Part of the Ligament: Here we obſerve the Ovaries begin ſmall; as you trace them on to the Middle, they grow larger: Afterwards they fall off in Size, till, at the lower End, they ſcarce have the Appearance of Ovaries, but finiſh in imperfect Figures.

Fig. *a* 1, ſhews the young Shells lying in one of the Ovaries, in their natural Size; in the front Edge of which, Fig. *a* 2. is the ſmall Valve cloſed.

Fig. *b*, is a ſmall Whelk-ſhell, or *Buccinum ampullatum* of Dr. *Liſter*, brought from *Virginia*.

N°.

Plate XXXIII.

N°. 4. *Alcyonium, ſeu Cyathus marinus.* Plate XXXII. Fig. *c. C.*
Sea Cup.

Theſe little Cup-like Figures are found on the Coaſt of the *Iſle of Sheppey*, in *Kent*, ſticking to Stones and Shells erect, many of them together. When they are firſt taken out of the Sea, they are of a bright ſemi-tranſparent yellow Colour, of a horny tough Nature, containing a viſcid Subſtance, with many Orange-coloured Seed, or Egg-like Particles, in the upper Part of each Cup, as they are repreſented magnified at Fig. *C*, Plate XXXII. Under it, at Fig. *c*, is exhibited the natural Size.

While I was at *Ramſgate*, in *Auguſt* 1754. I met with ſome of this Kind; which, upon raiſing up the *Operculum* at the Top, I diſcovered, by my Microſcope, to be full of ſmall Periwinkles completely formed. The Figures of theſe Shells are deſcribed at Fig. *c*, and a little magnified at Fig. *C*. So that we may properly look upon this Sea-Cup as the Ovary to the Periwinkle Shell-fiſh.

It is recommended to the Curious, to obſerve at the Sea-ſide, whether there may not be ſome Animal of the Polype Kind ſeen at the Top of each of theſe Cups; as we already find ſomething ſimilar to this Contrivance in the Sea-Fig, or firſt *Alcyonium* of this Claſs (See Fig. *D*, Plate XVII).

N°. 5. *Alcyonium, ſeu Fucus nodoſus & ſpongioſus.* R. S. N°. 42. p. 49. Plate XXXII. Fig. *d. D.*
Sea ragged Staff, called by the Fiſhermen Pipe-weed, or Pudding-weed.

This irregular-ſhaped yellow ſizy Subſtance, repreſented in Plate XXXII. at Fig. *d*, is found adhering to moſt kinds

of marine Subſtances, on the Coaſt of *Kent*, near the Iſland of *Sheppey* particularly; ſo that it frequently becomes troubleſome to the Fiſhermen, by often clogging their Nets.

Upon examining a croſs Section of it in the Microſcope, it appeared full of ſmall regular Specks, as it is repreſented at Fig. *D*, Plate XXXII.

Since then, I have examined ſome farther advanced Specimens, and they appeared full of ſmall regular Figures of an Egg-ſhape, like thoſe repreſented in Plate XXX, at Fig. *D*.

This *Alcyonium* deſerves a more critical Enquiry. It appears at preſent to me, to be the Spawn of ſome numerous Species of Shell-fiſh.

I ſhall now take the Liberty to add the microſcopical Deſcription of a moſt elegant Sea-production, which carries a great deal of the Appearance of a Plant, and, poſſibly, may be of the vegetable Tribe. But I have introduced it here, to ſhew the ſingular Appearance it makes, when examined by the Microſcope. It is called,

Plate XXIII. Fig. *c*. *Fucus maritimus, Gallopavonis pennas referens.* H. Ox. III. p. 645. T. 8. f. 7

Fungus auricularis. Cæſ. Ej. Pin. 368. 11. R. S. N°. 14. p. 43.

Turky Feather. *Dale*'s Hiſt. of *Harwich.*

It has the Appearance of the variegated Agaric, from whence poſſibly it has been conſidered as a Sea *Fungus*. It is very thin and flat, and ſtands upright, having many Leaves riſing out of the ſame Stem.

Fig. *C*, Plate XXXIII. gives its natural Appearance.

The Roots, examined in the Microſcope, appear divided into

into ſmall clear Tubes, conſiſting of equal longiſh Joints, each containing a ſoft Subſtance in it.

Fig. *E*, is the magnified Part of a ſmall Piece of the Roots, repreſented at Fig. *e*.

The flat Stem, and broad thin Leaves, are no more than a Continuation of theſe jointed Tubes, riſing Side by Side, and growing on together in ſuch a manner, that the Joints become placed alternately by each other, as at Fig. *D*; which is Part of a Leaf magnified. The natural Size of which is expreſſed at Fig. *d*.

The whole Surface of each Leaf, ſeems to be covered with an exceeding thin whitiſh Skin, which receives the Impreſſion of the minute, regular, long-ſquare Joints.

The dark curved Lines, that we obſerve, at every Tenth of an Inch Diſtance, at Fig. *c*, in the natural Appearance of this curious Figure, are full of brown Seed-like Particles. Theſe, as they ripen together, or advance to Maturity, burſt thoſe thin white Membranes; which ſhrink back, and leave theſe ſemicircular Spaces bare, with theſe round Bodies ready to drop off, as they are repreſented at Fig. *D*.

When they are magnified higher, as at Fig. *F*, they appear like a Grape-ſtone incloſed, all but the Baſe, in a viſcid tranſparent Subſtance.

CHAP. X.

Of Tubular Corals, *&c.*

I Shall here add an Account of ſuch other Marine Bodies, as have caſually occurred. And, firſt, ſhall give a Deſcription of an irregular Maſs of Sand, which appears to have been cemented together by a particular Species of Sea-Worms. I have called it,

Plate XXXVI. Fig. *A. B. C.*

Tubularia arenoſa Anglica.
Engliſh tubular ſandy Coral.

This is found very often, in Pieces of conſiderable Magnitude, on the Coaſt near *Yarmouth*, about Low-water Mark, and on the Shores near *Dieppe* in *France*; from which laſt Place the Specimen, Part of which is exhibited, in its full Bigneſs, in Plate XXXVI. Fig. *A*, was brought to Mr. *Emanuel Mendez da Coſta*, F. R. S. who was ſo obliging as to ſend it to me. The whole Specimen was about ſix Inches long, five broad, and three thick, of a dark ſandy Colour, brittle Texture, rather light than heavy, porous on all Sides, but on ſome diſtinguiſhed by peculiar Apertures.

The upper Part of the Maſs, which is here called its Front *A*, is of a moſt remarkable Fabric. One may compare it to a Number of ſmall, and ſomewhat flatted, Funnels, placed obliquely one above another, and ſo cloſe, that the upper Edges of every lower Tier are hid by the lower Edge of thoſe above them; and are placed ſo obliquely, as that the Hole at the Bottom of each, which may be called the Tube of the Funnel, may plainly be ſeen: This Tube is continued from the Bottom of the Cup of the Funnel to about

about one-half deep in the Stone, not always continued in a ſtreight Line, or to the ſame Depth, of the ſame Diameter, but a little ſlanting or curved; and of a larger or leſs Bore or Depth, according to the Size of the Animal inhabiting each Funnel. Theſe Tubes appear opened length-ways in the perpendicular Section at *B. B.* And the different Bores may be ſeen in the tranſverſe one at *C.*

Upon moſt of the Cells, we obſerve a little Cover, or *Operculum* of Sand; which, it is probable, the Animals form for their Security and Defence, when they retreat from the open Funnel-like Part into the Tube.

Theſe Tubes, as hath been obſerved above, are not of the ſame Dimenſions, nor always ſtreight: But in this they all agree, that their Bottoms are cloſed up, the Animals filling up behind, as they advance forward, by a conſtant Appoſition of ſandy Particles, united together by a glutinous Matter iſſuing from them.

The Animals that erect theſe connected Habitations, when examined by the Microſcope, are remarkable.

Fig. *a, b,* repreſent them in their natural Size.

Fig. *c, d,* the ſame magnified, from whence it appears they are of the *Scolopendra* Kind.

The Head *(e, f,)* conſiſts of three oval Rows of flat ſtiff Quills, of a fine Pearl-like Poliſh. Theſe are moveable, at the Will of the Animal, in different Directions, and for different Purpoſes. In the longitudinal Slit, that divides theſe three Rows, is the Mouth, towards which the inner Row is inclined. Each Row of Quills is divided into two Parts, and is moved by different Muſcles.

The two Muſcles of the outward Row appear immediately

under it, and ſeem inſerted in the Fore-part of the Neck. The Quills of this are hooked at the Ends, and placed ſo, in each Diviſion, as if turning to meet the other in the Front. Towards the upper Part of the Body are ſix curious Feet, three of a Side, formed like Fins, compoſed of ſix Quills each in the Shape of Oars.

The ſmall Feet on each Side, down to the Tail, are compoſed of Tufts of minute ſharp-pointed ſhining Quills.

In the Centre of the Body is a round Lump, which, probably, is the *Matrix*, or Ovary of the Animal.

The Deſcription of a TUBULAR CORALLINE *from* Malta.

AS other Species of Animals, beſides Polypes, are the Fabricators of Tubular Corallines, I thought it might not be improper to introduce a Deſcription of ſome curious Tubes, with their Animals, brought in Spirits from the Sea-coaſt of the Iſland of *Malta*, communicated to me by my worthy and ingenious Friend, Mr. *Peter Collinſon*, F. R. S. and deſcribed in Plate XXXIV. I ſhall call this Coralline,

Plate XXXIV. Fig. *a. b. d. e.*

Corallina Tubularia Melitenſis, ſcolopendris, tentaculis duobus duplicato-pennatis inſtructis.
An Penicilla marina?
Malteſe Tubular Coralline.

When I took theſe Tubes and Animals out of the Spirits of Wine, I perceived a ſmall ſlimy Bag, into which the Baſes, or firſt Beginnings of ſeveral of theſe Tubes, were inſerted, as may be obſerved at Fig. *d*.

The Tubes, which are built by the incloſed Animals, increaſe gradually in Diameter, as they riſe in Height. The outſide

Plate XXXIIII.

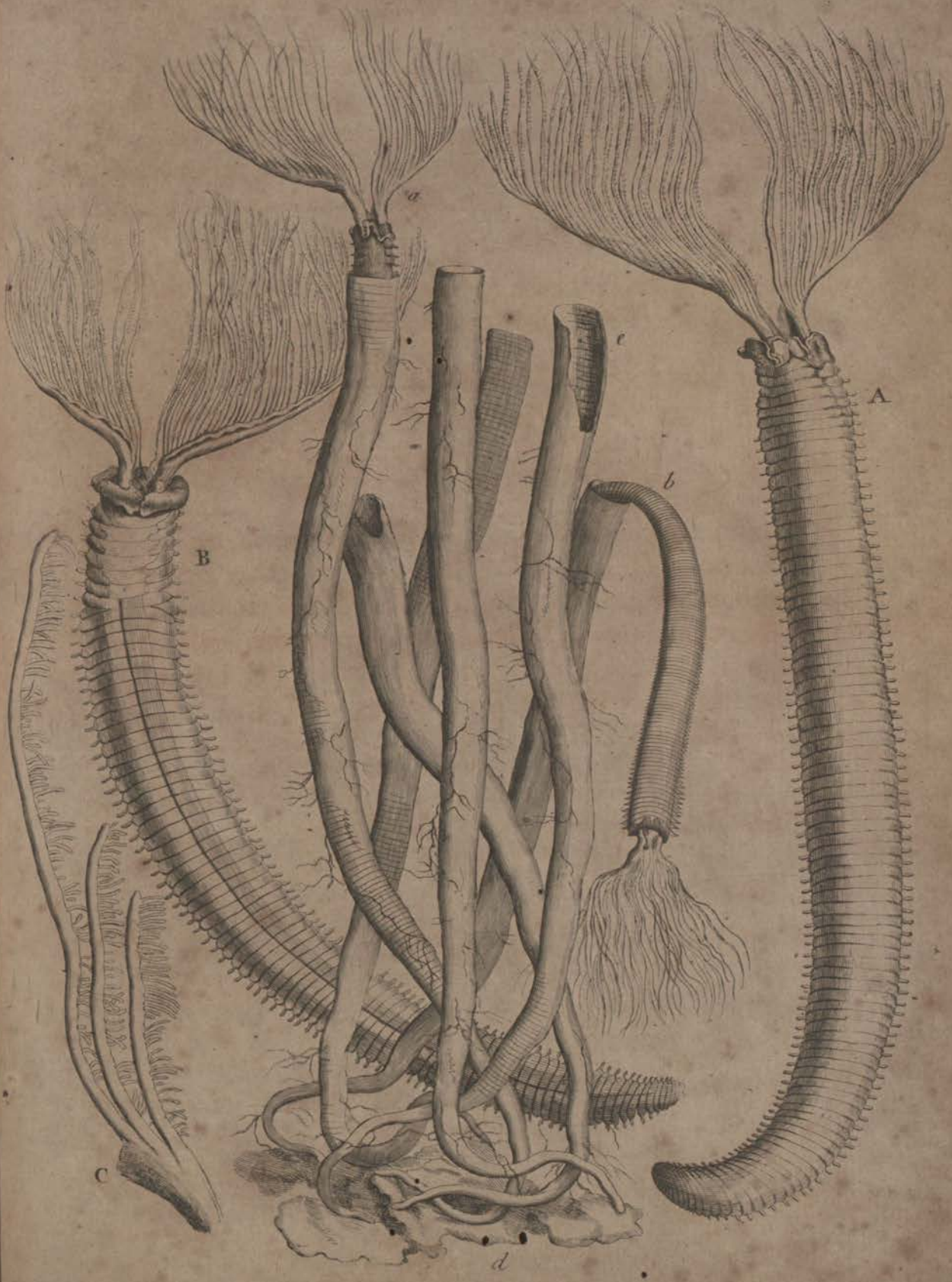
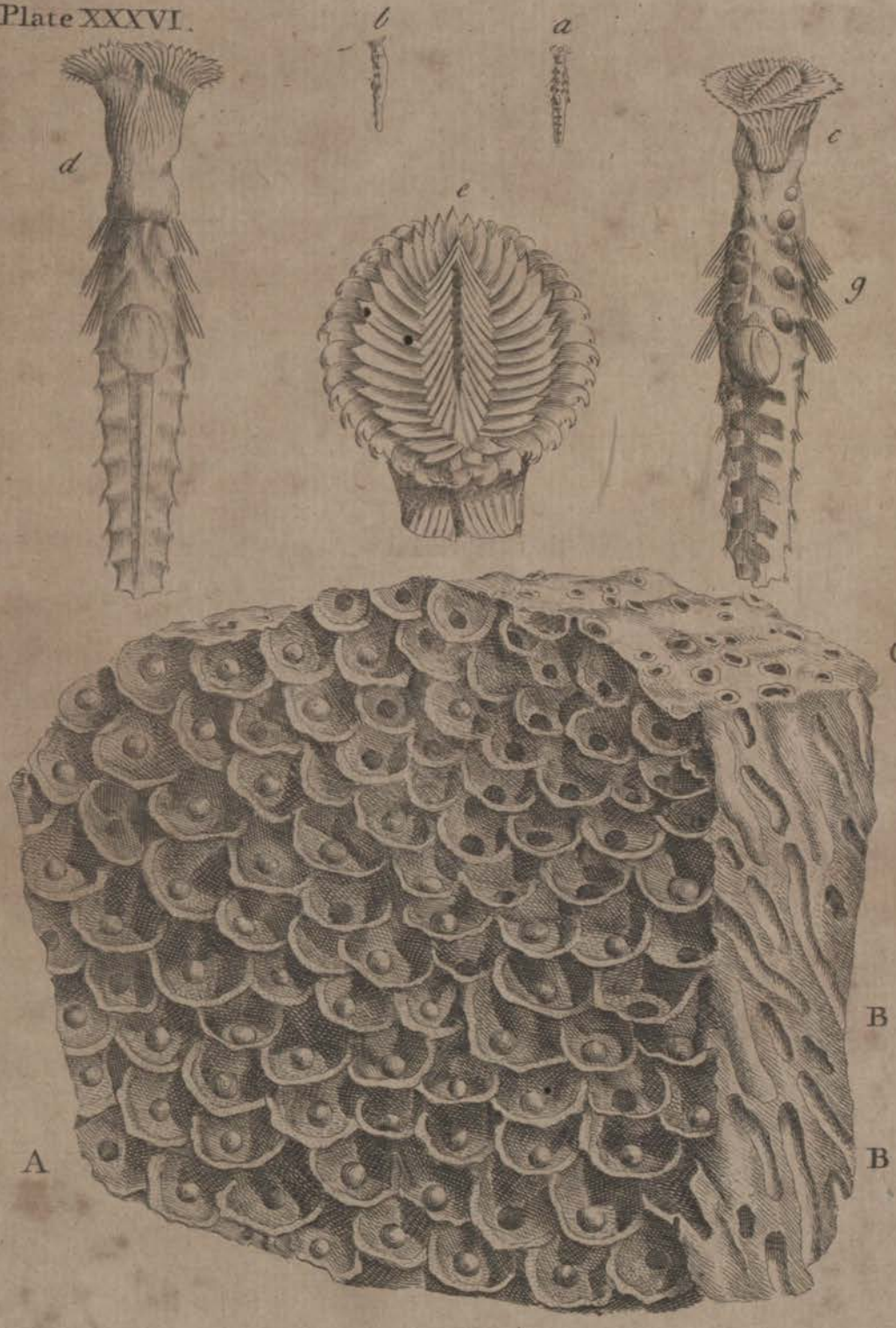


Plate XXXV.

Plate XXXVI.



outſide Coat of the Tubes is made up of circular Stripes, of an Aſh-coloured earthy Matter in different Shades, cloſely cemented together; and the inner Lining, which is firmly united to the outward one, is made of a tough horny tranſparent Subſtance, with a very ſmooth Surface. The Cavity of the Tube is perfectly round, though the Animal, which inhabits it, and is of the *Scolopendra* Kind, is in Shape ſomewhat like a Leach extended and compreſſed: It appears, by the Mark of its Feet on the Inſide, that it can turn itſelf freely about, and riſe up, or retreat at pleaſure, the better to attack and ſecure its Prey.

This *Scolopendra* has two very curious and remarkable Arms, or *Tentaculi*; the left much larger than the right. They are doubly-feathered, as may be ſeen at the magnified Part at *C*.

The Number of Feet on each Side exceed 150. For a further Explanation, I ſhall refer to the Plate XXXIV. where Figure *b*, is the Belly-part of the Animal in its natural Size, hanging out of the Tube. *B*, is the Belly-part magnified. Fig. *a*, is the Back-part of the Head of the Animal in its Tube. *A*, is the Back-part of the whole Animal a little magnified. Fig. *e*, ſhews the Inſide of the Tube, with the Shades of Aſh-coloured *Strata*, ſeen through the horny inſide Lining.

Some Obſervations on the Formation of the RED CORAL, *and ſome Species of* WHITE CORAL.

THE Red Coral of the *Mediterranean*, ſo well known among us, appears to be formed from Succeſſions of ſmall Tubes, which riſe many together, and branch out in different Plate XXXV Fig. *e*

different Directions, ſo as to look like Stumps, or ſhort Branches of ſome marine Shrub petrified.

In ſome Specimens, which I have before me, many of the *Tubuli* are to be ſeen creeping, as it were, together over Pieces of White Coral, and varying their Directions, according to the Oppoſition they meet with in their Progreſs.

But theſe we find compreſſed and ſhrunk; and, no doubt it is the ſame on the main Branches. The *Tubuli*, being compoſed of cretaceous Matter, mixt with a viſcid animal Subſtance, ſhrink in and become ſolid, as their Inhabitants deſert them; that is, theſe different component Particles, ſtrongly attracting each other, become hard like Cement made of animal *Serum* and *Terras*.

When the Specimens are recent, we find them covered over with a red mealy Subſtance, which looks like a Bark to the Coral; but, upon examining it narrowly, we find many Star-like Cavities on this Surface (See Fig. *a*, p. 35). and, upon raiſing up the mealy Subſtance, we find theſe Stars have a Communication with the Tubes underneath. If we view the Points of the Branches, we may ſee evident Marks of the Ends of Tubes, as at Fig. *c*, Plate XXXV.

And further, if we examine the laſt incloſing Series of *Tubuli*, that have roſe up, and encompaſſed the Coral, we ſhall find them of a yellowiſh Colour, and not ſolid like thoſe in the inner Part. Theſe the Coral-Fiſhers find full of a milky Juice, which is no more than the tender Bodies of the Animals.

The Star-like Cavities, no doubt, receive their Figure from the Claws of certain Polypes, which, we may naturally conclude, are the Builders, as well as the Inhabitants, of this beautiful Fabrick.

The

The ſcarlet mealy Subſtance on the Surface, magnified by N°. 1. the greateſt Magnifier of *Wilſon*'s Microſcope, exhibits the Figures of hollow Croſſes combined together (See Fig. *A*, Plate XXXV); whsch, no doubt, are of ſome very material Uſe to this Fabrick and its Inhabitants; though wherein, we are yet ignorant.

The Increaſe of Coral by a conſtant Succeſſion of Tubes riſing up, and encompaſſing the Trunk, and extending the Branches, is very well illuſtrated in the Inſtance of the Stem and Branches of the Herring-bone Coralline, Plate X. where at Fig. *B*, the *Tubuli* are magnified. But as this Coralline is compoſed of light ſpongy and elaſtic Materials, the Cavities do not cloſe up; but, at the ſame time the Stem grows hard, it remains porous and woody, like Cane. Though in Phyſics it is unſafe, to draw general Concluſions from particular Inſtances, yet the Texture of the ſmall, elegant, White Coral, repreſented, in its natural Appearance and Size, at *b*, Plate XXV. is ſo agreeable to the general Tenour of Nature's [illegible] in the Formation of the marine Bodies already deſcribed, that it would almoſt induce one to think, the ſtony Corals, for the moſt part, are produced in like manner; that is, that they are compoſed of Tubes, formed by Animals of the Polype Kind.

The Coral above-mentioned is fairly repreſented, as it appears magnified at *B*; in which Figure we may diſtinctly trace the Tubes, from the Baſe up the *Outſide* of the Branches: And, on the *Inſide*, their Openings are as conſpicuous.

For this curious Specimen, with that of the Red Coral, and an Opportunity of examining many rare Sponges, Corals, and *Lithophyta*, together with his kind Aſſiſtance in this Work, I am indebted to my much eſteemed Friend Doctor *John Fothergill*.

An Account of a CLUSTERED SEA-POLYPE, *found in the* North Seas, *near the* Pole.

THIS I ſhall call after Dr. *Linnæus*'s Name, which he has given the common Polypes, but very properly adapted to this, *Hydra Marina Arctica, corporibus multis octitentaculis, baſi conjunctis, & ſcapo prælongo oſſeo, ſuſtentatis.*

This very uncommon Animal is here repreſented in Miniature, at Fig. *a*, Plate XXXVII. to give us the clearer Conception of its true Figure, as it appears in the Sea.

It was taken by Captain *Adrianz*, of the *Britannia*, while he was on the Whale-Fiſhery, in the Summer 1753, ſticking to his Sounding-line, at the Depth of 236 Fathoms, in the Latitude of 79 Degrees North, 80 Miles from the Coaſt of *Greenland*.

The upper Part of it conſiſts of 23 Bodies of Polypes, united at their Tails to one common Baſe, ſo as to form one Animal, and appears in its natural Size, with Part of its Stem, extending itſelf at Fig. *A*.

Fig. *B*, expreſſes it as it was received, after it had been ſoaked in Water, and the *Tentaculi*, or Claws, ſtretched out. During the Time it was under Examination, it yielded a rancid Smell like dried Fiſh, tending to Putrefaction, and looked of a ruſty Iron-colour.

The croſs Section at *F*, ſhews the Situation of the ſeveral different Bodies: Ten occupy the outward Circle, nine the next, and four the Centre.

The Captain at the ſame time took another of theſe Cluſtered Polypes, with above 30 Bodies united together; but this, having met with ſome Accident, a little below the

a
K
A
M
D
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C
E
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H

uniting of the Bodies, exhibited but a very confuſed Appearance.

When they were firſt drawn up near the Surface of the Water, the Animals were expanded; and looked, as the Captain obſerved, like a Noſegay of bright yellow ſtarry Flowers (See Fig. *A*).

Each diſtinct Polype has eight *Tentacula*, Claws, or Arms; each Arm is furniſhed on both Sides with Rows of Fibres, that ſeem to do the Office of Fingers. In the Centre of the Arms, where they unite, is the Mouth, which is furniſhed with two erect indented or ſcolloped Lips.

Upon diſſecting one of theſe Bodies length-ways, Fig. *G*, I found many ſmall Seed-like Particles, in the cellular Cavities of a ſtrong wrinkled Muſcle, which compoſed the whole Length of the Inſide. Theſe were of the Size of thoſe repreſented at Fig. *l*; and, upon being magnified, they appeared of a compreſſed orbicular Shape, as at Fig. *L*; and may poſſibly be the Spawn of the Animal.

From the lower Part *N* (See Fig. *B*), the indented muſcular Baſe, where the Polypes all unite, proceeds a hollow Bladder-like Membrane, Fig. *M*, which is kept extended for about two or three Inches, by the ſlender, arched, and twiſted Top of the bony Stem, which is likewiſe inſerted in the Middle of the ſame indented muſcular Baſe.

This Bladder ſeems calculated, as well to raiſe or ſink the Animal at pleaſure in the Sea, like the ſwimming Bladders of Fiſhes, as to convey by this Chanel the neceſſary Materials, which the ſeveral different Bodies collect for the Support and Increaſe of the long bony Stem, a Part that

ſeems to be of the higheſt Importance, to the Preſervation and Well-being of this extraordinary compound Animal.

The Membrane, or Bladder, as you trace it downwards, cloſes round the Stem, and becomes a Cuticle to it, covering it the whole Length, till it ends in a Cartilage at Bottom.

This Stem, which is of an Ivory-colour, is Four-ſquare, with a Groove on each Side; and continues increaſing very gradually in Thickneſs, from a very ſlender Beginning to One-fourth of an Inch ſquare, and in Length to above ſix Feet, till it comes to within four or five Inches of the Baſe, where it begins to contract, and come to a Point, as at Fig. *E.*

This Part is covered with a browniſh yellow Cartilage, which is here laid open, to ſhew the finiſhing of the bony or ivory Part in the Middle of it.

Fig. *D*, repreſents the lower Part of the Stem, where the Membrane, or Cuticle, begins to grow cartilaginous; and is the natural Appearance of the Baſe of the Stem, the ſame that is laid open at Fig. *E.*

Fig. *I*, ſhews a ſmall Part of the Cuticle ſtript off the upper Part of the Stem.

Fig. *C*, repreſents a Part of the Stem twiſted, which Degree of Force muſt have happened to it, when it was in a younger and ſofter State.

Fig. *H*, is a croſs Section of the Stem magnified, ſhewing the ſeveral ſemicircular *Laminæ*, incloſing one another in the ſeveral Quarters.

Upon endeavouring to cut off a Slice of the Stem, it grated againſt the Knife, as if it were partly Stone, and partly Ivory.

Upon throwing a Fragment of it on the Table, it ſounded like a Piece of a Tobacco-pipe.

With ſome Difficulty, I cut off a thin Slice, which I put into Vinegar, on which a ſtrong Effervescence enſued; and, when the Vinegar had been changed two or three Times, I found the cretaceous or ſtony Matter was depoſited, and only the Membranes, that incloſed the *Laminæ*, remained; ſo that it appeared to me as much of the Nature of Coral, as of Bone or Ivory.

At *K*, is a Figure of the *Encrinos*, or *Lilium Lapideum*; which, whether it may not be the petrified *Exuviæ* of this Animal, is ſubmitted to the Conſideration of the Curious in Foſſils; for they have not yet been able, I apprehend, to fix upon any thing more probable.

The Difference that appears to me, upon conſulting *Roſinus*, a *German* Author, who has publiſhed a Treatiſe at *Hamburgh* particularly on this curious Foſſil, is, that the *Encrinos* has rather been a Species of Star-fiſh, with a jointed Stem or Tail; and the Rays of the Star, inſtead of having *Tentacula*, or Claws, at the End of each, like our Polype, are furniſhed with Ranges of jointed Fibres, along the Inſide of each Ray like a Bruſh; of which the ſame Author has given a curious Plate, with a particular Deſcription of this extraordinary Foſſil.

So that this curious Polype, is rather, I ſhould think, of another Genus, and ſeems to be intirely unknown to us till now.

CONCLUSION.

THE Reader hath now before him a Recital of the moſt obſervable Circumſtances, that have occurred to me in my Enquiries into the Nature of Corallines, together with a faithful Repreſentation of the principal Kinds, and of the Polypes that inhabit them; for of this Species of Animals, they undoubtedly are. Accident firſt threw the Subject in my Way; unexpected Diſcoveries awakened and kept up my Curioſity; and, remote as the Nature of my Employment is from Reſearches of this Sort, I could not avoid filling up the leiſure Hours my Buſineſs allowed, with attending to Objects, minute indeed, but full of pleaſing Wonder.

Many Hints I owe to the Converſation of my Friends; and I cannot but acknowlege, that whatever elſe may have accrued to me from theſe Purſuits, they, at leaſt, have been the Means of procuring me many valuable Friendſhips, and an Acquaintance with Men who do Honour to their Country, and their Species.

I have ſhunned Conjecture, as much as poſſible, in this Recital; and, if in any Place it occurs, it is rather with a View to excite thoſe, who have it in their Power, to demonſtrate the Probability or Improbability of what I advance by Experiment, than to impoſe my Opinion upon any-one.

I own, I am led to ſuſpect, that by much the greateſt Part of thoſe Subſtances, which from their Figure have hitherto been reputed Sea-Shrubs, Plants, Moſſes, *&c.* are not only the Reſidence of Animals, but their Fabric likewiſe; and ſerve for the Purpoſes of Subſiſtence, Defence, and Propagation, as much as the Combs and Cells fabricated by Bees, and other Inſects, ſerve for ſimilar Purpoſes.

That

That many, if not all the different Species here deſcribed, are of this Kind, I think is inconteſtable: But that Animals of ſo ſoft, ſo yielding a Texture, as all the Polypes, yet known, ſeem to be, ſhould be capable of conſtructing Habitations of a Texture ſo united, hard, and with ſo little Poroſity as to bear an exquiſite Poliſh, perhaps may appear to ſome incredible.

But what are Oyſters, and all the other Shell-fiſh we are acquainted with in theſe Parts of the World? Subſtances from which one would as little expect the Solidity, and almoſt everlaſting Hardneſs of their Shells, as we ſhould from a tender pliant Polype the ſtony Firmneſs of Red Coral: And yet thoſe Shells are the Fabric of the moſt ſoft and yielding Bodies, as much as the Lapideſcent Corallines and Corals are conſtructed by the Polypes.

Many of the Corallines ſeem to conſiſt of a ſingle Tube, containing a ſingle Parent Animal. Every Branch emitted contains an Offspring of this Parent, dependent upon it, yet capable of producing its like in the Emiſſion of a new Branch; and ſo on, as far as the Law preſcribed to each allows.

Others conſiſt of many ſuch Tubes united, riſing up together, and Side by Side incircling the deſerted Tubes of their Progenitors; whoſe *Exuviæ* become their Baſis and Support, as theirs muſt, in their Turn, be the *Subſtratum* of a riſing Generation.

In ſome, theſe Tubes remain empty, and a Section diſcovers, at leaſt the Veſtiges of the Cavities compreſſed, as in many of the *Keratophyta:* Whilſt in ſome of the ſtony Corals, theſe Hollows are ſo exactly filled up, as to leave no Traces of tubular Cavities, except on the Outſides only; and theſe, had

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had they remained longer in the Ocean, would moſt probably have been equally effaced, by a ſucceeding Progeny.

It may ſeem too haſty to conclude, that not only the Subſtances, deſcribed in the preceding Pages, are of Animal Production, but even that thoſe more compact Bodies, known by the common Appellations of Star-Stones, Brain-Stones, petrefied *Fungi*, and the like, brought from various Parts of the *Eaſt* and *Weſt Indies*, are of the ſame Origin; and yet, there is one very ſtrong Preſumption in favour of ſuch an Opinion; which ariſes from this Obſervation, That the Ocean, in all the warmer Latitudes near the Shores, and wherever it is poſſible to obſerve, abounds ſo much with Animal Life, that no inanimate Body can long remain unoccupied by ſome Species. In thoſe Regions, the Ships Bottoms are ſoon covered with the Habitations of Thouſands of Animals; Rocks, Stones, and every Thing lifeleſs, are covered with them inſtantly. Even the Branches of living Vegetables that hang into the Water are immediately loaded with the Spawn of different Animals, Shell-fiſh of various Kinds. And Shell-fiſh themſelves, when they grow impotent and old, become the Baſis of new Colonies of Animals, from whoſe Attacks they can no longer defend themſelves.

If therefore Animal Life is here ſo plentifully diffuſed, that neither inanimate Bodies, nor thoſe in which the Powers of Vegetation are vigorous, nor Animals themſelves, if declining from their natural Vigour, can be ſecured from Encroachments; how canwe to ſuppoſe, that the Bodies we are treating of, were they inanimate altogether, could remain ſo free as we find them, from ſuch Intruders? In ſhort, was there no other Reaſon to ſupport the Allegation, this alone ſeems to make it more than probable, that the Polypes inhabiting the Corallines, Corals, Star-Stones, Brain-

Brain-Stones, and the like, are capable of defending themſelves from ſuch Invaſions, whilſt they continue in full Vigour; which is farther demonſtrated, by what happens to them in common with every other lifeleſs Being in the Ocean; when, through Accident or Age, the Vigour of the Republic fails; they then yield to ſuperior Force, and become the Baſis of ſome more powerful, fortunate Succeſſors.

And now, ſhould it be aſked, granting all this to be true, to what End has ſo much Labour been beſtowed in the Demonſtration? I can only anſwer, that as to me theſe Diſquiſitions have opened new Scenes of Wonder and Aſtoniſhment, in contemplating how variouſly, how extenſively, Life is diſtributed through the Univerſe of Things: So it is poſſible, that the Facts here related, and theſe Inſtances of Nature animated in a Part hitherto unſuſpected, may excite the like pleaſing Ideas in others; and, in Minds more capacious and penetrating, lead to farther Diſcoveries, farther Proofs (ſhould ſuch yet be wanting), that One infinitely wiſe, good, all-powerful Being has made, and ſtill upholds, the Whole of what is good and perfect; and hence we may learn, that, if Creatures of ſo low an Order in the great Scale of Nature are endued with Faculties that enable them to fill up their Sphere of Action with ſuch Propriety; we likewiſe, who are advanced ſo many Gradations above them, owe to ourſelves, and to Him who made us and all Things, a conſtant Application to acquire that Degree of Rectitude and Perfection, to which we alſo are endued with Faculties of attaining.

FINIS.

The DESCRIPTION *of Mr.* CUFF'S AQUATIC MICROSCOPE, *uſed in the* DISCOVERIES *made in this* ESSAY.

A, The braſs Pillar, that ſcrews into the Top of the Box *K*, which Box contains the whole Apparatus.

H, The Shank, with the Semicircle carrying the Concave Mirror, that moves on two Pivots, at *I*, *I*.

D, The ſliding Pillar to adjuſt the ſilver Diſh, with its Lens at *F F*, to the proper focal Diſtance.

G, Another ſilver Diſh, with a higher Magnifier.

E, The Shank (ſupporting the ſilver Diſh) made to ſlide to and fro, to view all Parts of the Stage *B*.

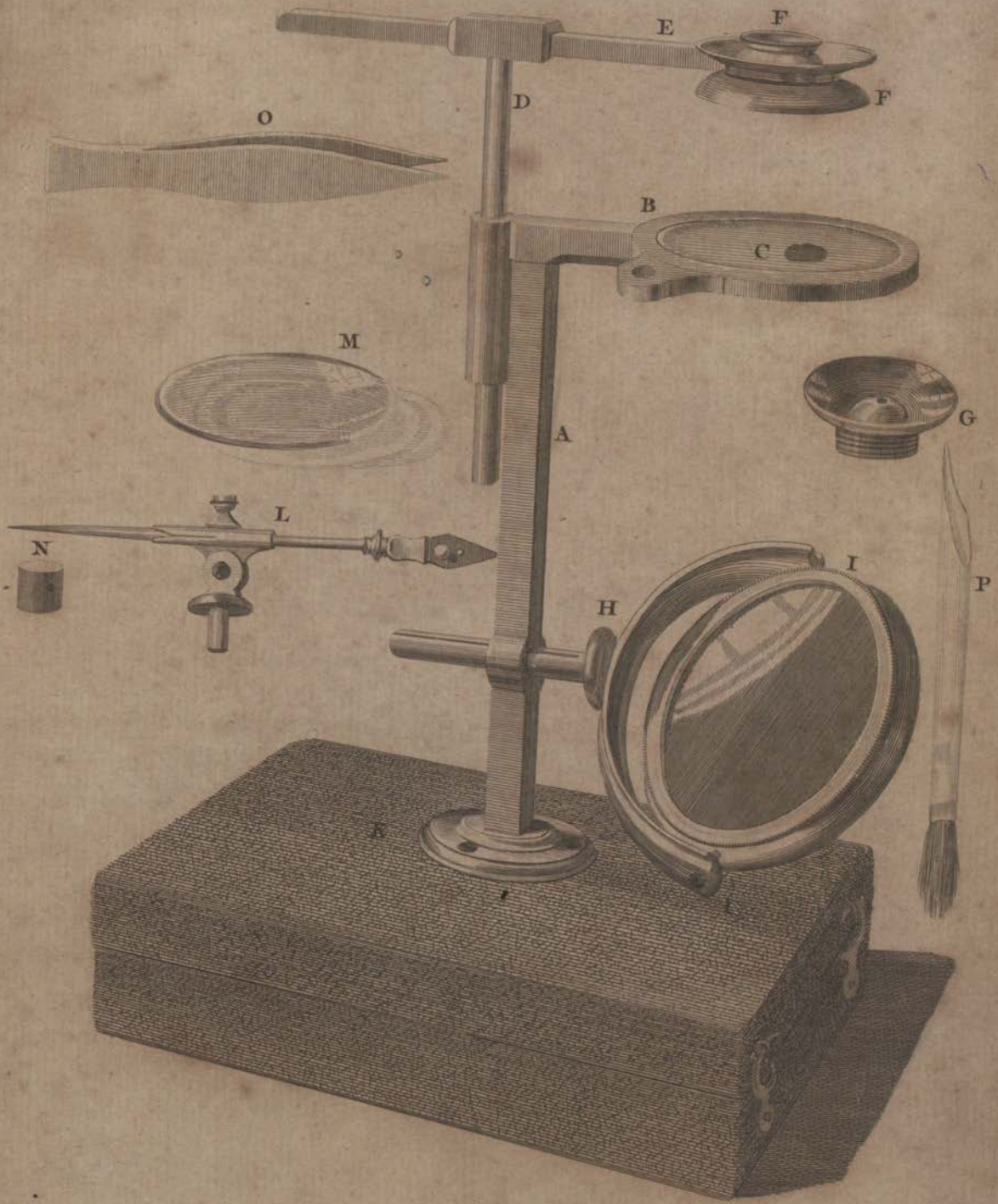
C, The plain Glaſs placed on the Stage, with a black Patch on it for opake Objects.

M, The Watch-glaſs, to be placed in the Room of the plain Glaſs *C*, for aquatic Objects.

L, The Pliers, pointed at one End for different Objects, or to receive on the pointed End the ivory Cylinder *N*, for opake Objects.

O, Pincers to take up ſmall Objects.

P, The Bruſh to clean the Glaſſes.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